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QL WORLD

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THOR

The Thor Computer System is a professional business machine designed with the user and his future requirements in mind. Cambridge Systems Technology have developed several models making the Thor extremely versatile: the single NEC 3.5in. floppy version with or without a 20M SCSI Winchester in addition to the dual floppy model packaged in a stylish metal case. The Thor is equipped with 640K RAM, parallel and serial printer ports, battery-backed clock and a separate IBM style (PC-AT) keyboard. Supplied free with the Thor is a specially commissioned version of the award winning Psion Xchange(*) software suite and a comprehensive manual. Special features of the Thor include multitasking at a single key-stroke and enhanced screen windowing representing excellent value for money.

THOR 20

The Thor 20 Computer System is the newest development from Cambridge Systems Technology, the very latest in high-speed processing. Based on the Motorola MC68020 processor, the Thor 20 delivers on average three times the computing power of the Thor. It is available with a choice of two clock speeds: 12.5 MHz (standard) or 16.7 MHz. The Thor 20 package includes a suite of development software comprising a specially commissioned macro assembler by Talent Computer Systems and a linker by GST in addition to the Psion Xchange(*) business software together with full supporting documentation. The Thor 20 Computer System provides a substantially higher performance than the Thor at a very cost-effective price.

THOR 21

The Thor 21 Computer System is designed for 'number crunching' applications. Based on the 68020 processor and additionally incorporating the MC68881 floating point coprocessor, the performance of floating point operations are dramatically improved — taking only 1% of the time taken without the coprocessor. This system is essential for a wide range of scientific and engineering applications and only costs an additional £201.25 (inc VAT).

QDisc Interface

The best-selling floppy disk interface is fitted with a 16K EPROM containing many 'Toolkit' extensions, and CST's Ram Drive 2. It may be used with most 3.5 or 5.25 floppy disc drives. CST's own twin slimline double sided 80 track 3.5 units being exceptional value for money, with 720K of formatted storage per drive. The Toolkit provides a wide range of SuperBASIC commands and functions designed to improve access to the powerful facilities of the QL without the need for machine-code programming. Job control is made easier, files can be used for random access, alternative character sets can be produced, 'wild cards' can be used in file operations, etc.

RAM Drive

The Ram Drive device driver allows free memory to be used as though it were a very high speed disc, in fact the fastest such device when used with the RAM-plus. Ideally used for the storage of temprary results, or multiple screen images for animated displays, it also eases the copying of files in single disc systems. The Ram Drive can only use memory which is free, so the full advantage is only felt if the QL is equipped with additional memory. Built into QDisc 4 and Thor, the Ram Drive is also available on 3.5in. and 5.25in. floppy disc.

RAM Plus

The CST RAM-plus unit expands the available memory of the QL to the limit of 640K. Using high grade 256K memory devices, this unit is the only one which offers the high performance of no wait-state operation. Housed in a rugged metal case, the RAM-plus unit has an expansion slot which duplicates the QL's, allowing any other CST peripheral to be used. Among the advantages derived from using the RAM-plus are the performance improvements of software and storage devices, and the ability to multitask several programs at once.

SCSI Interface

CST's Interface for Rodime compatable Winchesters handles up to 8 SCSI devices and is complete with floppy disc interface. Using enhanced QDISC software, it supports heirarchical directories, easing file management; with well over 1000 files being possible, this is absolutely essential. A Data Management Utility is provided which speeds up backups by only copying recently modified files.

Q448 Interface

The Q-488 provides comprehensive yet simple access to the IEEE 488 Instrument Bus for the Thor and QL. Developed with IEEE specialists Procyon Research Ltd, the Q-488 interfaces to equipment directly from SuperBASIC and other languages and provides commands for low level bus control and even built-in bus analysis.

* Xchange is a Trade Mark of Psion Ltd.

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Unfortunately, we are no longer able to answer enquiries made by telephone. If you have any comments or difficulties, please write to The Editor, Open Channel, Trouble Shooter, Technical Helpline or Psion Solutions. We will do our best to deal with your problem in the magazine, though we cannot guarantee individual replies.

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NEXT MONTH

More roms

Simon Goodwin will be levering the lid off the QL even further as he delves into the second and final episode in the great ROM saga. Everything you ever wanted to know about the QL ROMs but did not know who to ask.

Interface investigation

With the number of programs for expanded QLs and disc drives, interfaces are high on the list of peripheral expansions. Which are the best? We look at the features, compatibility, timings and costs.

Compilers

There has been much consternation over the two major compilers available for the QL. We compare Turbo against the latest version from Liberation Software. Which is the best for your application? We provide the answers.

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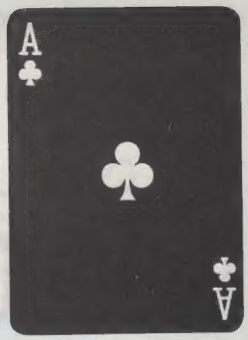

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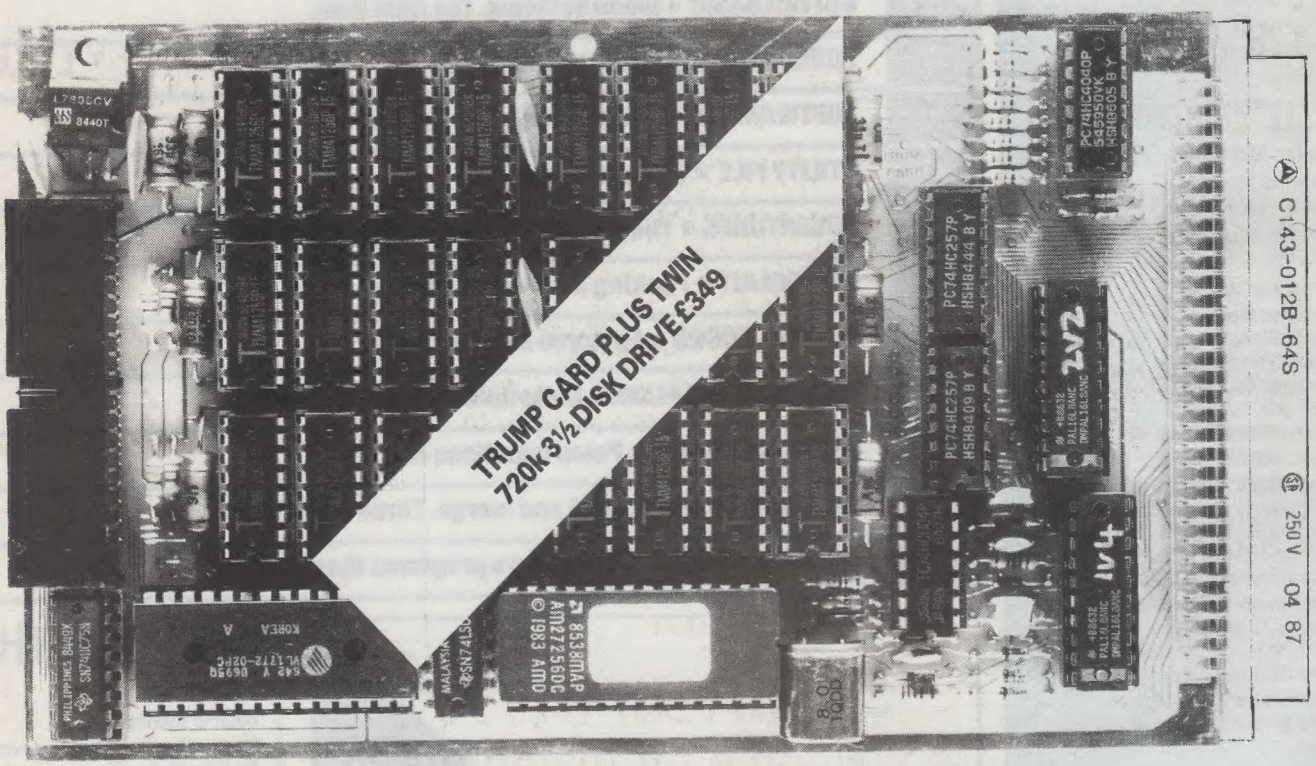

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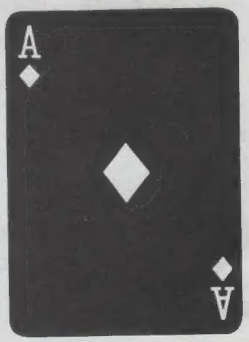

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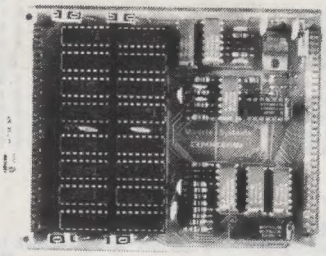

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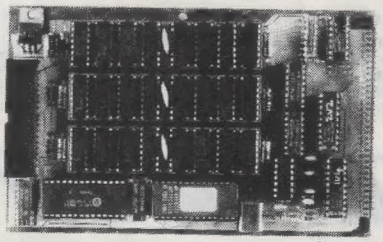

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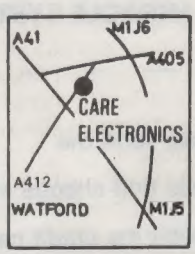

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QL SCENE

Open Forum

Another QL Microdrive magazine, *Forum*, is available. It is produced by Ian Bruntlett with the specific aims of providing a forum for discussion about the QL, to provide alternatives to high-priced commercial programs, and to provide another means for software houses to demonstrate their products.

The first two issues are already available and Bruntlett is looking for ideas for issue three. Each issue is provided on one Microdrive cartridge with a boot file showing the various page numbers.

Issue one contained such items as a window editor, a review of 4Matter and Locksmithe, and a reverse Polish notation evaluator. Issue two included a memory-shrink program, a procedure/function library utility, a review of QL Squadrons and a notice-board type of editorial.

The cartridges provide little extras for the information-starved QL owner. Further details are available from Ian Bruntlett, 25 The Broadway, High Barnes, Sunderland SR4 8LP.

User Xchange

The Xchange User Association has been formed as an independent body to support users of the Psion Xchange software and PC 4. Membership costs £25 per annum.

The objectives include exchange of ideas between users, two-way communication with Psion, to accumulate and provide users with a library of submitted programs and literature, and to communicate to users through a regular news letter.

For further details write to XUA, PO Box 115, Beckenham, Kent.

Trader bargain

Since our review of the *QL Small Traders Pack* — May, 1987 — version 2 has been released. Using *QLoad* from Liberation Software, it will load all programs in secconds. Fully menu-driven, Small Traders is supplied with an A4 manual on two Microdrive cartridges for £24.95 plus £1 post and packing if overseas. Updates for present owners can be purchased for £10.

The Small Traders pack includes simple accounting of up to 100 accounts, with a maximum of 450 transactions per month or quarter. Up to 450 items can be stored and summed for stock control. The pack can store names, and addresses can be stored now with an addressee field.

Other features include a label designer, mini-calculator, point-of-sale display generator and a unit convertor. Further details are available from SD Microsystems, PO Box 24, Hitchin, Herts.

Fonts for the Memory

Since our review of *Inkwell* — June, 1987 — Palantir Products has released a revised version, *Inkwell Deluxe*. The new version of this font editor and print utility allows users to design fonts on a 16x16 grid, with up to eight fonts in memory and a further six on cartridge. Font design commands include shadow, rotate, squeeze, flip, negate, lighten, bolden and outline.

The print utility allows you to print-out documents from any standard editor — e.g., Quill — using any or all of the fonts in up to nine widths and two heights. An overprint facility — between one and nine passes — often found on desk-top publishers, produces sharper output for photo-copies. Any document can be previewed on-screen to see how it looks before printing.

Inkwell Deluxe costs £16 including manual and p&p. Upgrade for existing users costs £7 on return of the original cartridge. For further details contact Palantir Products, 78 Leighton Road, Bedminster, Bristol.

File-o-Fax system for the QL

SD Microsystems has released a *File-o-Fax* system for the QL. Designed as a series of databases and spreadsheets using Archive and Abacus, the package sells for £9.95 plus £1 post and packing if overseas.

Features include a multi-purpose reference system, a desk diary, an appointments diary, and a home and business budget section, allowing estimated figures and cashflow projections.

The advantages of having such a system on a relatively stationary machine are dubious. We will review the product in the near future.

Super Swopper multi-tasking software

Compare has improved its *Task Swopper* multi-tasking software. New features include cloning of jobs to save memory, a ready-made start-up menu, menu-driven printer-driver selection, the ability to set up background jobs which will never be suspended, automated set-up of the QL clock which will multi-task with any other programs, and compatability with the Qats front-end program.

Despite all the additions, the program still fits into less than 10K of code, making it ideal for those short of memory. In addition to those features, the new version is supplied with a laser-printed A4 spiral-bound manual. The price has is still £19.95. Further details are available from Compware, 57 Repton Drive, Haslington, Crewe CW1 1SA.

Taskmaster winners

Winners of the Taskmaster competition, printed on page 34 of the May, 1987 issue, may be wondering why they have not received any software yet. Apologies are necessary.

Sector Software is been ready to send the Taskmaster prizes for some time. Unfortunately, during our recent office move a few things were misplaced, including the full names and addresses of the winners.

If your name appeared among the list of winners. will you please send your full address to Taskmaster Winners, Sinclair QL World, Greencoat House, Francis Street, London SW1P 1DG.

Open Channel is where you have the opportunity to voice your opinions in *Sinclair QL World*. Whether you want to ask for help with a technical problem, provide somebody with the answer, or just sound off about something which bothers you, write to: Open Channel, Sinclair QL World, Greencoat House, Francis Street, London SW1P 1DG.

OPEN

Pause for thought

As a fellow teacher, I was interested in Leslie Fahidy's article in the February, 1987 issue. Reading through the listing, I was struck by one or two procedures which do not seem to take advantage of the power of SuperBasic. I am a purist and I do not think that GOTOs contribute anything to clarity but, apart from that, I have the following suggestions for improvement. They mostly involve additional parameters which SuperBasic has as "optional extras" to the usual commands.

For example, PAUSE(-1) will wait until a key is pressed and then continue, so lines 260 to 300 can be replaced by this single command, as can other parts of the listing. In fact, the structure occurs so often that I would use a separate procedure:

1000 DEFine PROCedure Presskey
1010 AT 18,1:PRINT"Press any key to continue."
1020 PAUSE (-1)
1030 END DEFINE

Similarly, INKEY$(-1) waits until a key is pressed, so lines 690 to 750 could be replaced by:

choice$ = INKEY$(-1)

'CLS 2' clears all lines below the cursor, so the whole of PROCedure erase can be replaced by:

AT 7,0 : CLS 2

Similarly, CLS 3 clears the whole of the cursor line and CLS 4 from the cursor to the end of the line. These are faster than the PRINT FILL$ routines and could be used elsewhere in the program.

In line 2710,

IF choice$ == "N"

covers both cases in one test. I would also have used the INSTR function in "check" and "any-more". For example.

IF NOT answer$(j)
INSTR("1234567890." THEN
faulty = 1
END IF

I hope you will find these comments useful and I shall read future instalments with interest.

Howard Clase, Newfoundland.

Professional editing

I feel I must congratulate Mike Lloyd on his excellent article in the April, 1987 edition of Better Basic. It contained a suite of mini programs dealing with the editor. Program listings, or rather the clumsy way in which the QL deals with them, has always irritated me.

I have spent many hours fumbling through long listings trying to find the block I need, often resorting to dumping the whole program to the printer to examine the listing. Lloyd's solution is so simple and very effective. It makes me wonder why I did not think of it.

Even so, I can offer an improvement. The procedure 'lp' in its present form works well if your programs are fairly short — i.e., fewer than 18 procedures. When listing procedures from long programs, all but the last 18 procedures scroll off the screen, leaving you with only a small portion of the program segments for examination.

I have therefore modified the 'lp' procedure and added three short procedures to cure the problem. Entering 'lp' lists the procedures as normal but stops when the screen is full, allowing the user to examine the first 18. The user then has two choices. Pressing ENTER clears the screen and lists the next 18 and so on but a touch of of any other key restores normal editing facilities.

To add this facility, delete lines 200 to 250 of the original program and replace them with the following:

Mike Barrett, Plymouth.

```
200 DEFine PROCedure lp
202 zero
204 display_page
206 END DEFine lp
208 DEFine PROCedure zero
210 startlist=1:endlist=18
212 END DEFine zero
214 DEFine PROCedure display_page
216 LOCal x
218 CLS#2
220 PRINT#2;"PROGRAM SEGMENTS"\\
222 FOR x=startlist TO endlist
224 LIST x*100
226 END FOR x
228 control
230 display_page
232 END DEFine display_page
234 DEFine PROCedure control
236 buffer=KEYROW(1)
238 IF INKEY$(-1)=CHR$(10)
240 startlist=startlist+18
242 endlist=endlist+18
244 ELSE
246 GO TO 32767
248 END IF
250 END DEFine control
```

Midi mistakes

I have been building a Midi interface for my QL, using a design from a book called *Midi Projects*, written by R A Penfold and published by Babani Books. The same author wrote an article for *QL World* in November, 1986.

I found the book to be good reading, showing several interesting and well-explained interfacing techniques for various micros, including the QL, and I would rate it as essential reading for the musically-minded QL user. There are, however, two mistakes in both the QL User Guide and Penfold's design which were brought to light during this project. So, for anybody wishing to carry-out any interfacing, here are the problems I discovered.

The first mistake concerns the signals on the QL expansion port — a DIN 41612 64-way connector. Careful checking of the signals indicated that the QL User Guide diagram and the diagram in QL Connexions — February, 1987 — show the pin-out back to front. The signals are shown in the correct rows but should be placed in an order with VIN at the far left of the connector and GND at the far right.

Also, in Penfold's book and article, he makes the same address decoding mistake. In the book — page 65, figure 31 — he shows pin 14 of IC3 connecting to pin 4 of IC2. This disables IC2 for the addresses given and should have shown pin 15 of IC3 connecting to pin 4 of IC2. In the *QL World* article, he shows pin 14 of IC2 connecting to pin 9 of IC3. It should have shown pin 15 of IC2 connecting to pin 9 of IC3.

A second mistake in the book occurred on page 25, where the outer connection of SK2 — Midi out — is connected to ground (0V). This connection should be severed and the outer connection attached to +5V.

D Birse, Forfar, Angus.

CHANNEL

Skyburst survival

I would like to contribute a loader program for the *Skyburst* program from the February 1987 issue:

```
10 MODE 8
20 INPUT "Enter number of ships"; ship
30 addr = RESPR (6000)
40 LBYTES mdv1-data,addr
50 POKE addr+1779,ship
60 POKE addr+2259,ship
70 CALL addr
```

where the input may be any integer up to a maximum of 255.

W Chemij,
Aberystwyth.

Compiler consternation

As a proud QL owner, I would like to thank the staff of *QL World* for an excellent magazine each month. The first reason for writing is to pass on my recommendation for the Turbo Compiler Package from Digital Precision. I had already bought Supercharge V1.17 earlier and all the problems which I had have now been resolved by Turbo.

Second, I would like to voice my criticism of the advertisement by Liberation Software for its compiler in the April 1987 issue. While I agree that the compiler which Liberation has released is an excellent program, I feel that it is most unfair to criticise Digital Precision directly through the advertisement. With reference to the letter in the advertisement, I had a delay in the delivery of Turbo but I was treated very well by Digital Precision, which kept me fully-informed about the problems it was having.

Andrew Roper,
Wigan.

Editor's reply: Thank you for your letter. I am pleased to hear you enjoy* QL World. *I agree with your comment about the Liberation advertisement. Unfortunately, the recent advertisement from Digital Precision is just as bad. This kind of attitude by professional companies can only harm their reputation and can do no good for their customers. Nobody seems to be able to agree which of the compilers is best and uninformed "bashing" will not help.* QL World *will be reconsidering both products in the near future and will be offering a fair and unbiased comparison.

Logical language

I am open to correction but I feel that it is logical to assume that our beloved QL has a higher percentage of technical, professional and computer science hobbyists than most other home micros. I base this on the fact that there seems to be an extraordinarily large percentage of utilities and compilers in the QL software base.

One sad omission from the otherwise bountiful language list is a Prolog interpreter. It would not seem to be an impossibly difficult language to implement, as borne out by the success of TurboProlog for the PC. I am sure that it would be welcomed and, more important for the writer, bought in large numbers if a QL implementation were to be released.

Desmond Hickey,
Dublin.

Editor's reply: I agree that Prolog is an excellent language for a number of non-numerical applications. Unfortunately, many software houses do not seem to understand that the QL is here to stay. Perhaps Logic Programming Associates will produce a version of its MicroProlog for the QL. After all, it has already been implemented on far less worthy home computers.

Which ROM?

I am very interested in buying either a JM or a JS Sinclair QL. I would be grateful if you would let me know for what serial number I should look.

William McAuliffe,
Tralee,
Republic of Ireland.

I own an AH version of the QL which I would like to upgrade, if possible, to a JS — I think this is the latest version. Could you let me know whether it is possible and, if so, where I could get it done and the approximate cost?

Christos Koutsoupas,
Whitminster, Glos.

Editor's reply: Congratulations to McAuliffe on the choice to buy one of the best micros available. There is much confusion about which ROM is best and how to upgrade QLs in general. To solve the problem, Simon Goodwin has written the definitive guide to QL ROMs and what to look for, starting in this issue.

RELEASE 3·1

Q-Liberator release 3·1 is packed with advanced features that take SuperBASIC programming into a new dimension. Now selected procedures and fuctions within any compiled program can be called by other programs – even interpreted ones. Your programs can become just like assembler extensions in the RESPR area. A unique OVERLAY command also lets you load libraries only when you need them. Reclaim the space later with the UNLOAD command. With parameter passing, GLOBAL variables and FREE RUNNING PROCEDURES which run independently of the job that starts them you have a totally new programming environment.

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BARCLAYCARD VISA Access

TROUBLE

Bryan Davies looks at more common problems designed to baffle and infuriate unsuspecting QL users. This month the Omni Reader and Run-time Archive receive the Troubleshooter treatment.

Carlo Cecchetti asked for help in the May issue with Oberon Omni Reader. R. Parrish of Croydon provided some background on it and the name of Metroheath — address at end of article — as a current source of Omni Readers — liquidation stock from when Oberon ceased business. It seels the unit at £59.95, including VAT, complete with user guide. It appears that the facility for reading-in new fonts was not developed. The main market was the U.S. and there may be software available there.

Experience

For those unfamiliar with the unit, it is an optical reader intended to allow direct input of printed text to the computer. Many people laboured for years to develop a cheap method of reading print into computers but it is a very difficult project, as I know from personal experience with large companies in the OCR business, and there are too many constraints on what can be read for wide sales of such a cheap device to be expected, at the current level of reading technology.

Nevertheless, the Omni Reader is said to handle pica and elite fonts from daisywheel printers, typewriters, newsprint, and photo-copies from the same, but not from DMP printers.

M. H. Mottram has acquired a Prism 14in. colour monitor which has a 20-pin connector but no lead to the QL. Can anyone provide information on this monitor such as manufacturer's/supplier's address, instruction book, connection details?

Some readers may not be clear what Run-time Archive is. It is obtainable from Psion and is two programs — a full-size version of Archive, called *Archdev*, and a cut-down version, called *Archrtm*. The latter is about 15K smaller than Archive and also requires less data space allocating to it when switching programs are used. It does not contain functions which are not needed when a program is fully operational — e.g., there is no Edit function.

To develop programs to run under Archrtm, Archdev is needed; such programs are saved as_pro files and you cannot use_pro files developed using Archive. When Archrtm is loaded, it looks automatically for a file called "boot_pro" and loads and runs that. For simple applications, that may be the only file needed, as it can contain all the procedures required. The first procedure still has to be "start". The general saving of memory space, and possible faster operation, make Archrtm worth having, specially if your QL environment is crowded — e.g., if there are several sizeable programs loaded.

Wiring

If you have a QL with D type connectors for the CTRL and SER ports you may have difficulty connecting peripherals. Does anyone have a circuit diagram for the Samsung-made QLs to enable me to find the necessary wiring changes? One device which is easy to connect is the Quickshot II Plus joystick, which can be bought with a D connector fitted to its lead; on the version I have seen the internal plug-on connections in the joystick have to be changed so that the orange — space bar — wire goes to the fourth connection from the edge of the PCB — originally on the third — and the red wire goes to the ninth from the same edge, originally on the tenth. Use the joystick in the CTRL 1 port. Having said that, I am awaiting a version with fewer wires and different connections but it should not be difficult to re-wire this.

Continuing progress in the area of resolved incompatibilities, Digital Precision reports that *Editor* version 1.17/1.18 and *Turbo Supercharge* version 1.14 have modified extensions files which enable them to be run successfully with *GRam, Taskmaster* and *Q–Switch.*

What is in a word? The expression multi-task in the true sense had led me into a lengthy discussion with an aggrieved supplier. Specifically I was accused of implying that Taskmaster cannot multi-task programs; that was not the impression I intended to convey.

Processor

The difference in opinion occurs because of the ways in which one can interpret both multi-tasking and true multi-tasking. It is rather like the word compiler; you have to be careful how you use, and understand, both. With compiler, the meaning of the word as given in one computer dictionary is a program which produces code which can be run directly by the central processor — the 68008 in the QL.

The word compiler has been in general use in the computing world applied to programs which do not produce such code and one has to accept that usage has produced a meaning of the word not necessarily in agreement with a dictionary definition. With multi-tasking, relating the expression to how it was used by Sinclair, tasks are those items you will find listed on the screen after you have typed-in ‹JOBS› — assuming you have this SB extension in the machine — and I thought that several files sharing one set of program code would be listed as just one Job or Task. In fact, jobs sharing code under Taskmaster are

SHOOTER

EMSOLVED

each identified in the Jobs list, just as they are if separate sets of code are used.

In practice, what the user sees may be little different between operations performed with shared — re-entrant — code and those performed with separate sets of code. That is, if the program is well-written, a switching program utilising shared code for several files can give the same kind of multi-tasking as a program written to use separate sets of code.

On my system, several months' experience with a separate code set-up has shown that printing from one document while editing another can be done fairly painlessly, and limited experience with a shared code set-up has proved the same operation to be possible.

With both programs, however, it is a little difficult in practical terms to consider that more than one job is going on if you try to edit one document at the same time as printing, loading or saving another. Printing fares second best if you make extensive cursor movements when editing and Microdrive activity tends to dominate any other. That is presumably a reflection on the capacity of the processor rather than on the switching software. That should not worry most people, though, because it is doubtful if they type fast and continuously enough to have much trouble editing while other jobs are going on.

Activated

In the general sense, whenever there are several programs loaded into the QL and each can be activated by pressing a few calling keys, the user will feel that there is some form of multi-tasking being performed; it is just a question of how much time is allocated to each operation during a given interval of time — for example, how many milliseconds an individual program runs in each second.

The *Xchange* suite allows the code of the Psion programs to be shared but work on an individual file is frozen when you switch to another file using the same program code, or even to a different program; the expression context-switching may be more appropriate for this mode of operation.

This applies only to programs in the Xchange suite and you can still run a program being frozen when you switch from one to the other. Switching from one file to another is instantaneous and only one key has to be pressed. Taskmaster also allows code to be shared but it does not stop work on one file when another is switched to.

Q–Switch uses separate sets of code and the user can determine the priority of each program, both when it is active and when it is inactive; if the inactive priority is set above 0, the program continues operating after another program has been switched to. With both switching programs, the inactive priority is typically 1, which is high enough to ensure that processing of the inactive job continues after switching to an active one.

Reduced

I am not familiar with *Swopper* but the letter in the May issue from Compware points out that it also is a multi-tasking programme. One merit of the shared code approach is the reduced memory requirement, which can amount to many K if you work with several files and only one set of program code. Of comparable significance, however, is the way the allocation of data space for programs is handled and there is considerable difference in the amount of memory taken by this process, with the various switching programs.

Forgive me if you have heard this many times but we still receive regular letters complaining about commercial program cartridges not loading. The writers of the letters do not seem to have considered the possibility that something is wrong with their QL rather than the cartridge. One cartridge may be faulty but is it likely that several would be? When you have received replacements and still find the program will not load, you have to think about the problem. Try obtaining a directory on another Microdrive, try copying a suspect file to the screen, try someone else's QL. If the operation works on another Microdrive or QL, you can expect that the problem is your Microdrive. With programs which do not load from mdv1, try copying them on to a blank cartridge from mdv2, assuming they are not copy-protected; that gives mdv1 a chance to produce files which it can "see", because often files which give no trouble on one drive can be a real nuisance on others.

Suppliers may tear their hair but they have to accept that some users are very unfamiliar with basic points about the QL, and computing in general. It is not surprising if once-used cartridges are returned with the comment "Won't format". For those who were not aware of it, Microdrive cartridges have the same kind of protection you can find on music cassettes; there is a small tab on the right side and, if it is removed, it will not be possible to record to the cartridge.

The once-used cartridges may have been intended for sale originally with commercial programs on them and the tabs will have been removed to avoid inexperienced users over-writing the files. Put a small piece of Sellotape in place of the tab to bridge the gap along the edge — the tape activates a micro-switch. Do not be fooled by an apparent willingness to accept copying of a file when the tab is missing; you can get some funny effects when you do this but the file will not be copied.

So, if you cannot format a cartridge, look for the tab. As there are so many suppliers offering cartridges and we have received calls complaining about the quality of some of them, we would be interested to hear comments from people who have bought new or once-used cartridges recently; please be certain before writing to us that you consider the points made about the possibility of your QL being at fault — where programs have been bought — and of the write-protect tab being missing — where the tapes are blanks, or used.

Complaint

It may give suppliers a laugh to know *QL World* is one the receiving end of a complaint. R. D. Hardie has sent programs for possible inclusion in the magazine but has received no reply. The programs feature has been a victim of its own success and there is a large backlog of submissions.

It was hoped to send replies to everybody who has sent programs by early July. In future, replies should be received within about six to seven weeks of the time of submission. Please

TROUBLE SHOOTER

A PROBLEMS SOLVED

do not write to enquire — letters usually take longer to deal with than telephone calls. Call and leave you address and telephone number so that you can be contacted later, but please do not call unless you feel it is absolutely necessary.

Responses

Damien Dougan reports that the Post Office has returned some Postal Order money to him as it apparently was not cashed by 4 Systems. As the money was sent originally for programs last summer, it looks as if we can assume the supplier went to inactive priority around that time.

Two suppliers have failed to respond to enquires concerning readers' complaints. Printerland has not told us why it did not send items ordered and paid for by B. N. Hardie and K. Baskaran, of Norway. Chromagraphica has made no comment on letters ffrom H. Mortenson of Sweden and V. Napolitano — this reader has had four monitors from this supplier so far and says they were all faulty. Two letters have been sent by *QL World* to each supplier in a period of several months and no replies have been received.

As to what the readers can do about goods not received, or received faulty, there is no simple answer. If goods are paid for by credit card and cost more than £100, claims can be made against the credit card company, but payment by cheque, cash, or money order leaves the buyer to clear only from the supplier. A letter from a solicitor, threatening legal action, may have some effect, but it may be better to take court action directly, through the Small Claims or County Courts. Advice on such action can be obtained from a local Citizens' Advice Bureau.

It is desirable to have a fully-documented compalint before going to the trouble and expense of court action; keep copies of all communications — note details of telephone calls — and obtain a report on defective goods from an engineer or well-known repair shop. Napolitano's latest monitor — Chroma II — works but the picture creeps off the screen, which may be a fault a TV repair man can fix; a written statement of the fault should be obtained from the repair

man, together with details of the work done and charges made, so that the amount being claimed in court is substantiated. Buyers living outside the U.K. are unlikely to find it worthwhile trying to take court action and the only thing I can suggest is to contact the commercial attache of their country in the U.K. and ask for contact with the supplier concerned.

Contradiction

John Pay wrote to confirm that his serial 8056 printer will not take 210mm. wide paper. M. H. Mottram advises that 216mm. wide paper can be bought from Tandy at £17.19 for six rolls. Dixons wrote to say that it has supplied 216mm. paper in the past and now supplies 215mm. paper, both sizes being suitable; it does not recommend trying to use 210mm. paper. That seems to contradict readers' experiences, as some have not found 215mm. paper at Dixons, but the company said it had recently put this paper into stock, so perhaps 8056 users should try Dixons again.

J. Pemberton-Bates found he had problems when he had the Sandy Q-XT640 kit and disc drives fitted to his QL, which already had an MCS 512K expansion board fitted. The utilities supplied with the MCS interface, and various programs from Talent, will no longer work, although the Psion programs work. Talent comments that the "Sandy upgrade has a different keyrow decode" and this makes it "incompatible with all software which uses the keyrow Qdos function."

It feels that the number of Sandy upgrades purchased is not sufficient to justify re-writing software to be compatible with it. No response had been received from Miracle or Sandy at the time of writing. There would appear to be no answer to Pemberton-Bates' problems at this time; it is interesting that CST has also been criticised for removing the Keyrow function when the Thor 1 was introduced but is now to provide Keyrow emulation on it.

Thanks to Portsea Island Mutual Co-Operative Education Committee for another offer to supply I. J. Bottomley with the Quest disc drive operating system software. Bottomley has now written to say that he approached Quest again and it has now sent him a copy of the operating system on cartridge, so that he is in business again and has made several back-up copies of the system.

Replacement

B. H. Jones got the "bad medium" message from the program *Concept 3D* and felt that a replacement cartridge was taking a long time to answer. Sector Software reports that it had to obtain a replacement from the U.S. via its U.K. supplier and the process caused a delay but Jones should now have received the replacement.

Oberon Omni Reader **Run-time Archive (£19.95)**

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SECTOR SOFTWARE

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TOUCH TYPIST

Don't even think about buying a replacement keyboard until you know how to use the one you already have. Why type slowly when you can be typing at professional speeds letters, basic programs, data etc can all be entered in a fraction of the time now taken by learning to type correctly. Did you know that it is harder to type with two fingers than it is to type correctly. Touch typist is the fastest typing tutor available for the Sinclair QL. It will teach you to type at up to 211 wpm. It is 100% machine code and has a keyboard tutorial to show you the keyboard basics, 3 teaching modes, adjustable speed and accuracy targets, very fast interactive keyboard, your results can be displayed on a graph and be saved to drive for future additions, the full lesson editor will allow you to alter and customise any or all of the 200 lessons which can then be save to drive to create a library of custom lesson sets, also included is a reward option where if selected providing you meet the requirements you specify you will be given a 100% Machine Code arcade game as a **reward for your progress Touch Typist will run from disk, microdrive or ramdisk. Available on disc or microdrive at only £12.**

THIS IS WHAT *QL WORLD* HAD TO SAY ABOUT THE PROGRAM

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SECTOR SOFTWARE, having bought the first two Z88's from Clive Sinclair would like to contact all users of this machine for our Z88 mailing list.

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Desk-top publishing

Ron Massey puts finger to keyboard as he reviews two packages for the DTP market.

One of the principal shortcomings of nearly all word processors is that there is no readily-available or convenient way to incorporate graphics, column-formatted text or specialised presentations into a finished document.

Developed initially by the publishing industry, desk-top publishing systems have evolved out of requirements for applications of computer graphics and phototypesetting components and, ultimately, into the extremely sophisticated production tools now used by the majority of publishing companies.

Available for some time on other microcomputers, the range of facilities for desk-top publishing has increased to a point where home micro versions often easily rival and sometimes outperform features found in fully fledged systems costing thousands of pounds.

Front Page Extra

A much-expanded version of the program reviewed some time ago, *Front Page Extra* will run on QL with add-on memory only. With a full 640K machine there is about 240K of free memory available to the user for multi-tasking FP with other utilities.

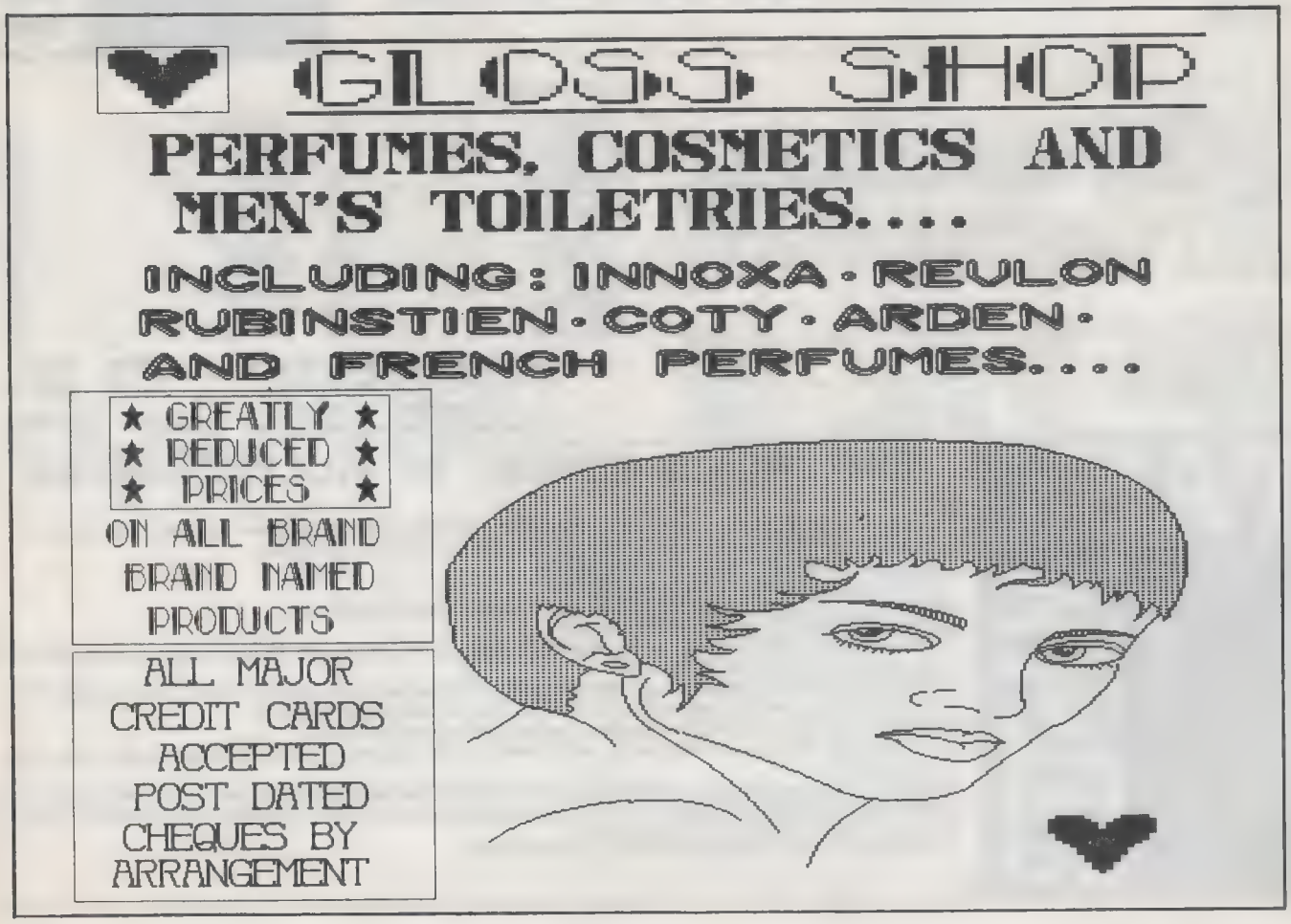
Front Page Extra, primarily a text-based utility, supports a useful range of user-defined graphics and minimal drawing facilities; drawings made by the majority of dedicated graphics programs can be imported readily into a page.

The simple structure of the menu system is aimed at ease of operation by novice and experienced users alike and requires minimal user input to get from one group of commands to another.

Adding to the versatility of the system is its ability to utilise UDGs in a useful manner. Supplied with a set of 48 UDG characters, you have the option either of re-defining them or adding up to 48 additional characters to the set for special applications.

One such application allows users to design electronic component symbols for each UDG and to use FP to produce detailed circuit diagrams not readily possible with many of the graphics programs available.

One of the new features to the FP system, implemented in Extra, is a means to view a complete page. This feature is useful for gaining an impression of the overall appearance of a page which, in spite of its being generally illegible at this scale, provides a visual impression of layout. Other layout controls provide an



option to specify the number of page columns, when importing Quill–doc files as either two-thre-or four-column layouts.

If CSIZE 0,0 is selected each page will provide space for about 1,200 words. If a Quill_doc file is imported, stripped of its control codes in the process, text layout is input automatically in columns. If the word count exceeds the available space on page one, it will be carried to page two.

Users should be aware that, once page two is full, text inputting will carry back to page one, deleting text already present, until the import is completed. Once aware of this potential hazard users can plan to split long documents into segments which can be handled by the system.

The precision right-hand micro justification is a pleasure to watch. When text is input, if the right-hand justify option switched to ON, each line of text is justified in terms of both character and word spacing by relative numbers of pixels added to correct spacing on a line; the limitation in this respect is that it justifies in terms of word spacing.

By handling justification in this manner, users have the facility to space characters in the manner used by professional printers, where "shims" are used to space individual typesetting characters on a line.

Program: *Front Page Extra*
Price: *£37.95*
Source: *Gap Software, 17 St. Johns Terrace, London E7 8BX.* **Tel:** *01-552 5452*

Program: *Desk Top Publisher*
Price: *£69.95*
Source: *Digital Precision, 222 The Avenue, London E4 9SE.*
Tel: *01-527 5493*

to space individual typesetting characters on a line.

FP file handling is what I can only call very tidily-implemented. Eight entries at a time are listed, with an option either to continue or to quit the directory. There is nothing more frustrating than to have a disc full of small files and to have to continue a long listing before being able to get out of the directory option.

Most of the minor criticisms I could level at FP have to do with my working preferences and habits than with any real shortcomings of the program. I felt that an eight-way, cursor movement would have enhanced cursor positioning but facilities have been implemented for moving in either character or a screen increments, in any direction and with a single keypress; once used to the solely bi-directional cursor movement there is little real inconvenience.

The Gap Software decision to rely mainly on the availability of a host of graphics packages for the inclusion of pictures in a page is justifiable. By taking this approach, Gap has been able to provide a more compact system with which to deal with text than might otherwise be the case.

I felt that some of the graphics facilities which were included could have been improved by providing better visibility of the single-pixel FP graphics

cursor, which could have either been larger, in either red or green, or a conventional crosshair.

The review copy had a file loading feature which, until I was used to the implementation, was confusing. Files are saved in page quarters; a typical directory will list a page as *file1, file2, file3* and *file4*.

When a page is loaded, only the name, "FILE", should be specified. Otherwise, if "FILE1" is specified for loading, a typical screen error message would report "*FILE11* not found".

Desk Top Publisher

Yet another new and comprehensive program from Digital Precision, *Desk Top Publisher* incorporates the miriad of features for which DP programs have become so well-known.

Having a strong background in various fields of graphics arts, I liked especially the range of graphics options available. Text facilities are provided with a large selection of both QL fonts and graphics-originated, icon-type character fonts.

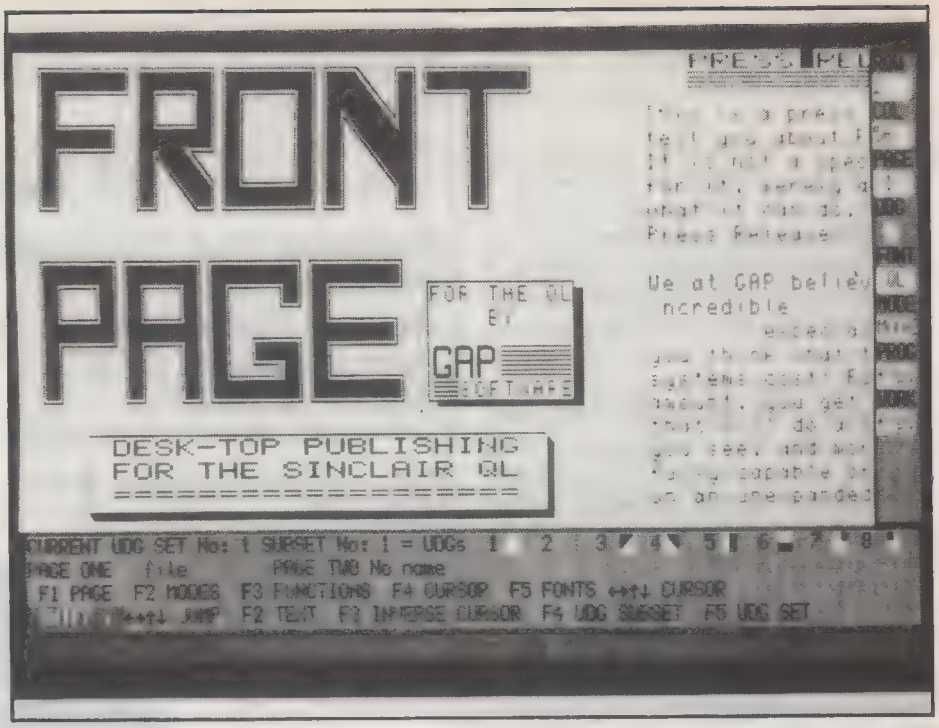
The QL font characters are printable in the usual range of CSIZES, although some of the fonts are more legible in some of the sizes than in others and require some experiment to obtain the best effects.

When a block of text is completed you are offered a range of text block processing options which include underlining, right, left or centre justification, text presentation as either solid characters or in any of several stipple patterns, and in any one of eight built-in — and an unlimited number of add-on — font styles for the current text input window.

If the input window is appreciably larger than is necessary for the current block of text and the underline option is selected, the system will asume that underlining should occur within the entire window. Once satisfied with the text in the current window, you are offered the option to exit the input window, at which time you are offered further options of either keeping the current block, discarding it or returning to the previous menu for further modification.

Movement round the screen can be made in character or single pixel increments. In common with Front Page Extra, full cut-and-paste features have been implemented, as has the feature of opening a window round a portion of the screen and re-positioning its contents in pixel increments.

The column structure permits a maximum of 66 characters. That means that, working up to the width capability of the majority of printers, you can have a minimum of two columns on a page.



A test page made during this report, formatted crudely to two columns of 66 characters and separated by 2.8 characters — 12 screen pixels — produced a right-hand margin of 17 characters — 204 screen pixels.

Text imports from prepared Quill *_lis* and Editor files are input, in the current font style, into a window opened for text. If the Quill document is wider than the window width, a screen line-feed is performed and text input continues until the window is full.

While Quill end-of-line control characters are ignored during input, other imbedded codes used by Quill, such as the codes for underline, are retained by the imported document as an unprintable character.

Scrolling option

Once the file has been read, you have the option of scrolling through its contents in the text window, either by line or a "page" at a time, until you get to the block of text you wish to include on a DTF page. Successive blocks of text are entered into columns in this manner.

If an attempt to import a Quill *_doc* file is made, text will include most Quill control codes and will be laid out in the typical Quill file format. Other DTP import options include graphic dumps produced by Eye-Q — from a compressed file — and other programs which produce standard 32K dump files.

Further into the system, past the character font utility, you have option of using icon-type characters. Twelve full graphic icon fonts are supplied in the system, in a wide range of alphanumeric characters and symbols. Alternative symbol sets can be used and loading them displaces those loaded by the program.

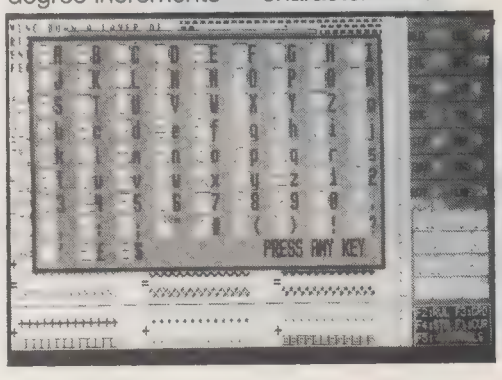
One of the most interesting features is the flexibility of the range of font editors. If you require a character font not already included in the DTP repertoire, you can either alter one of the existing ssets — and optionally save it as a separate file, which can be used at a future time— or you can design a completely new font from scratch. Graphic icon fonts can be altered or added to with equal ease.

Graphic fonts

Graphic fonts generally require two files and editing occurs at two separate levels. Each character may be edited with regard to both content and/or for its spacing proportion in relation to other characters in a set. If you require specific character spacing in the graphic character mode, relative row spacing of any of the characters may be altered temporarily.

The third option available for manipulation of the graphic characters is a scale editor. The default size of this character mode is a little larger than CSIZE 3,1. Pressing ‹ALT›‹X› while in this mode accesses the character magnification utility menu, consisting of a grid into which you can set the screen printing height and width of the icon fonts individually.

Other icon font features include the facility for character rotation — in 90-degree increments — character mirror-



ing, setting italics to forward or backward slant, adjusting line feed, adjusting the merging style of character with a range of attributes — including many different stipple patterns — inverting characters and for switching character descenders on and off.

A good range of input aids has been provided and includes a removalbe grid and horizontal ruler. A permanent vertical ruler, to the right of the screen, is provided for accurate positioning of text input windows.

Screen prompts and information, relative to the current working mode, are always present to the right of the working area. Help pages, also pertinent to each mode, are available by pressing ‹F5›.

Several options for printing a completed DTP page are offered and ask initially for "Printing Density" from a range of one to five passes of the printer head. You are then asked if you wish to have the page represented in cameo — upright, on a sheet of A4 paper — or sideways.

Page content

If the sideways option is selected and you are using cut sheets you should be careful to observe the content of your page because, if you have produced a full screen of text, the print will run off the end of the paper.

A surprising omission is the facility for specifying default source and destination drives. Contrary to current conventions, access to files must always include the drive ID.

As one might reasonably expect, both program systems have their strengths and weaknesses. Deciding which is most suitable for your purposes will depend largely on two factors — your price range and whether you wish to have a publishing system primarily either text-or graphics-orientated.

When viewed in perspective, the two desk-top publishers available for the QL represent exceptional value. Both provide features which enable the user to obtain highly-acceptable, formally-presented copy from dot matrix printers.

Market share

Although competing for shares of the same market, each system is aimed at distinct groups of end-users and includes facilities which are likely prove attractive to each. Although both will import straight text and Quill files, curiously neither will import both types of Quill files. Front Page Extra copes with _doc files with no problem at all. DTP, on the other hand, requires that a _lis file — made by selecting the Quill print option and, rather than selecting "printer" as the last input command, you enter a drive_filename, instead — be imported into an opened window.

Any criticisms which can be aimed at either system arise mostly from their early stage of development and in no way reflect a real limitation of their potential. From an end-user's point of view, using Desk Top Publisher is a little like going on a treasure hunt. Its many features become apparent only as one acquires familiarity with its control system. Finding a menu required to do a particular job will take a little time. There is a tendency for keys, used to enter control commands, to vary from one subsystem operation to another. I felt that the use of memonics would have been beneficial in remembering which keys were used for the various functions.

Undoubtedly, future editions of Desk Top Publisher will include a smoother user interface but, at present, version one requires that commands be entered with a wide range of single and key combinations. It is surprising that only the main menu is provided with both key and menu-bar selection alternatives.

The character capabilities of DTP put it in a league of its own and, in the final analysis, character flexibility is what publishing, whether for newsletters or more formal purposes, is all about.

Since DTP employs liberal use of keyrow, it is compatible with only the later releases of the Thor. I believe that the version number id 4.1 upwards but, not having a Thor, I have no way of ascertaining this.

Genuinely helpful

Of particular value to users of Front Page Extra is the genuinely helpful back-up service supplied by Gap Software. Regular newsletters to FP club members keeps them posted on developments. I have found that Gap supplies a valuable and readily-available back-up service for its products, particularly regarding the elusive subject of printer drivers and program compatibility.

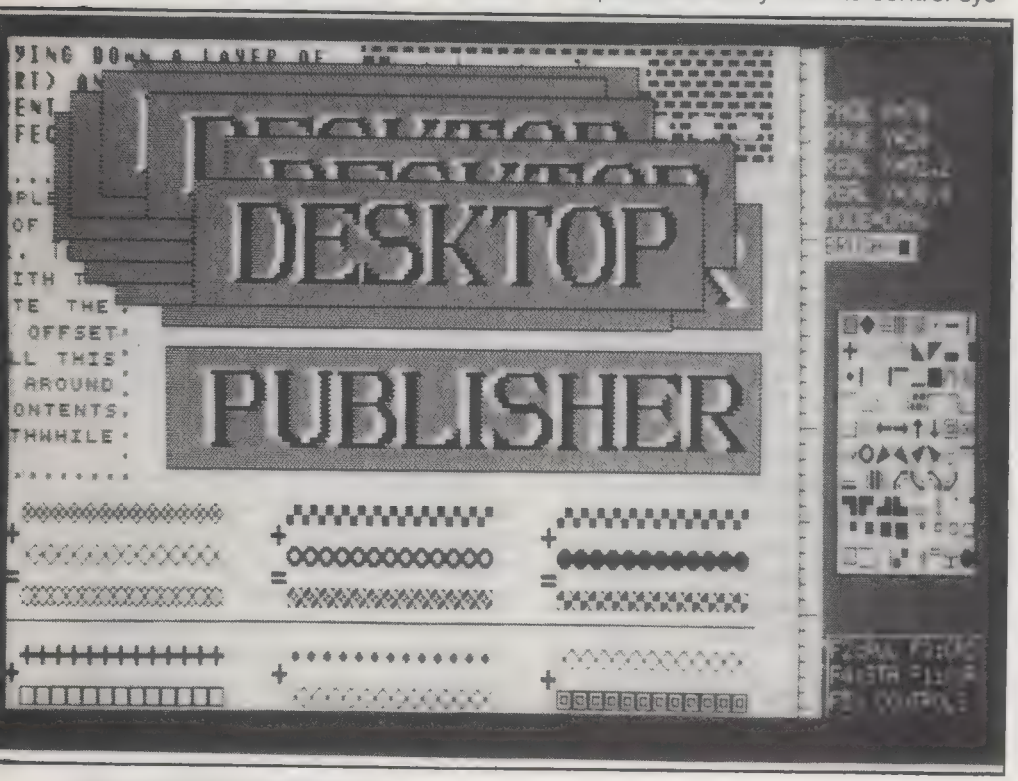
Comparing desk-top publishers with similar programs available for other machines, one is struck by the fact that, continuing in the QL convention, both are moderately-priced and provide users with truly cost-effective systems.

A number of the other systems with which I have had some experience, such as the one available for the Amiga, had only the mouse/icon/menu operation to commend it. After the novelty faded I found the Amiga hydrid mouse/keyboard operation irksome. Other options on the Amiga publisher I tried are more limited than either of the two systems now available for the QL.

The *Apple Mac Publisher*, naming one other example, is a knockout. It is more sophisticated than either of the publishers presented in this report but is supplied on three discs, costs more than £600 and requires a considerable amount of expensive, sophisticated hardware — the Apple Mac included — to run it.

Where else but in the world of the QL could you hope to find two very good programs at well below £100 which can cope very well with the majority of publishing-orientated applications?

Top left: Editing on screen with Front Page Extra.
Bottom left: A wide range of options.
Below: Editing with Desk Top publisher in draw mode.



Bugging the ROM

Compiler Simon Goodwin summarises the bugs, features and international variations which lurk inside each QL version and explains how you can upgrade your ROM.

Sinclair produced at least seven versions of the QL ROM the collection of built-in routines which look after Basic and machine code programs. Five of the ROM versions are still considered current, yet they vary enormously in functions and reliability. To check the version of your QL, turn it on without a tape in drive 1, press F1 or F2, and type PRINT VER$. A two-or three-letter code will appear at the top of the screen.

This article compares the features or, to be more honest, the bugs in current QL ROMs and explains how all the versions came into existence in the first place. Next month I will list the universal bugs in every QL ROM regardless of vintage and explain how to get around them.

This litany may make the QL seem rather a disaster but that is not really fair. The first QLs were unfinished and bug-ridden as a consequence but later versions are no worse than the average Amiga, ST or PC. All complex systems contain bugs but hardware manufacturers are curiously shy about admitting and correcting. In fact, bugs are rarely a problem if you know about them and can avoid them. This information is based on my experience, the Sinclair bug list and reports from QL users. If you have found any I have missed, please send details.

Team effort

In 1983 the QL ROM was planned as a team effort. The operating system was to be written by the Cambridge programming house GST, while Sinclair staff contributed code to handle devices and the new Basic interpreter. SuperBasic was designed originally in 1982 for the SuperSpectrum, one of the many Sinclair designs which never passed the drawing board stage.

On January 12, 1984, long before the QL hardware and software were finished, Sinclair launched the QL in London. The prototype machines at the launch used the GST 68K/OS operating system but Sinclair never shipped a QL in that form.

The original plan was to squeeze SuperBasic and the QL operating system into 32K of ROM. At first only a fraction of SuperBasic was to be built into the QL – just enough commands to load and run the Psion Packages. Most of the language was to be loaded as required from Microdrive; almost all the standard SuperBasic commands and functions are still implemented as extensions, although they are built-in to current ROMs.

Sinclair abandoned the GST operating system because it was slow and greedy for memory; it did not leave sufficient space for SuperBasic in ROM or the Psion packages in RAM. GST released 68K/OS independently as a 32K plug-in option at the end of 1984.

The first production QLs contained two-thirds of a stop-gap operating system, Qdos, written by Tony Tebby, a Sinclair engineer who had originally been hired to work on satellite TV hardware.

The other one-third of Qdos and SuperBasic was supplied in an ugly plug-in cartridge — 'the kludge'. It had been impossible to squeeze the required code into 32K so Sinclair put an extra 16K outside the computer. All the software was in expensive, individually-programmed EPROM chips, rather than mass-produced ROMs.

The version number of Qdos jumped suddenly from 0.08 to 1.00 when the first production QLs appeared but that was more brave than honest; the code was still being developed in April, 1984 as those machines slipped out. There were amazing bugs. You could not edit a 'bad line'. PRINT -2 - 2 gave zero. Basic programs could not exceed 32K. There were error-trapping keywords but no code to handle them.

Special tokens to allow array initialisation survive from that time but they have never worked; they are left-overs from the initial SuperBasic designs. READ, DATA, GOSUB and RESTORE had been added at a late stage, to make the original, elegant design more standard. The last-minute changes provoked a flood of problems.

Sinclair gave each ROM version a two-letter code. First was Qdos 1.00, the largely-untested "FB" version. The next major version, "PM", was faster and more tolerant of the Microdrives but it was still laced with faults. At that stage new versions, such as "EL" and "TB", were popping up inside Sinclair every week.

In all 13,000 kludged QLs were produced but in June, 1984 the so-called final QL ROM emerged, the "AH" version. By that time Sinclair had stopped naming ROMs after taxi-drivers and started picking on women in the office — "AH" stood for "Angela's Holiday".

The "AH" ROM was really three 16K EPROM chips. The plug-in kludge was avoided by soldering two chips piggy-back in one socket. The chips contained Qdos 1.02, the first usable version of the QL built-in software. It was about 20 percent faster than "FB"; since then, code speed has changed very little. The "AH" ROM and the mass-produced follow-up "JM" were supplied as a free upgrade to those with kludges.

Exceptional bugs

"AH" and "JM" were very similar. Only four bugs were exceptional to "AH". None was serious at the time, although two are worth bearing in mind if you have an expanded QL system.

If two tasks tried to read a file simultaneously, the second would miss the beginning and read the directory header instead. At the time that was fairly academic as there were no multi-tasking programs on the market. Floating point arrays were limited to 384K in size but memory expansion was not available in those days.

The other two bugs fixed between

"AH" and "JM" were trivial X=". " Set X to zero under the "AH" ROM, instead of giving an error, and you could type-in integer FOR loops, although they would not work unless you changed the variable name to a floating point type. The correction for this bug was scarcely an improvement; rather than make integer loops work properly, "JM" and later ROMs will not let you type them in at all.

The "JM" software was the first to fit into two chips, using the space allocated originally on the QL circuit board. The first socket was intended for a 16K chip but on "JM" systems it held a 32K component. The second socket held the remaining code in a partly-used 16K chip.

Upgrades from "AH" to "JM" or later ROMs are not a simple matter of swapping components. Unfortunately the control signals required by three EPROMs are not the same as those needed by two ROMs. I have converted my QL from EPROM to ROM; it is fiddly but not too difficult if you are used to messing around inside computers. If not, you should get a QL repair firm to do the job for you – it is easy to write off a QL by damaging the circuit board.

Turn off the power, then unplug the EPROMs, which are behind the CTRL connectors in sockets labelled IC33 and IC34. Disconnect the trailing wire to the top EPROM; it is needed only to provide an extra signal for the third chip. Then plug the 32K ROM — marked '0000' after the version number — into the slot for IC33; the other ROM, marked '8000', goes into the other socket.

There are six positions for wire links to the right of IC34, labelled JU1 to 6. The first two are connected for EPROMs; to use ROMs you must cut link 1 and connect links 3 and 4. Finally, unplug the chip labelled SN74LSOON immediately to the right of the links; it is needed only by EPROMs

The upgrade from "AH" to "JM" is fiddly and does not fix many bugs. The next version of Qdos is a more popular upgrade, although it creates almost as many bugs as it cures. Early in 1985, Sinclair began shipping Qdos version 1.10, the "JS" ROM. At first it was claimed to be a development version, not intended for release. That may well have been the case but tens of thousands of ROMs were made. The "JS" ROM is the last version used in machines made for sale in Britain.

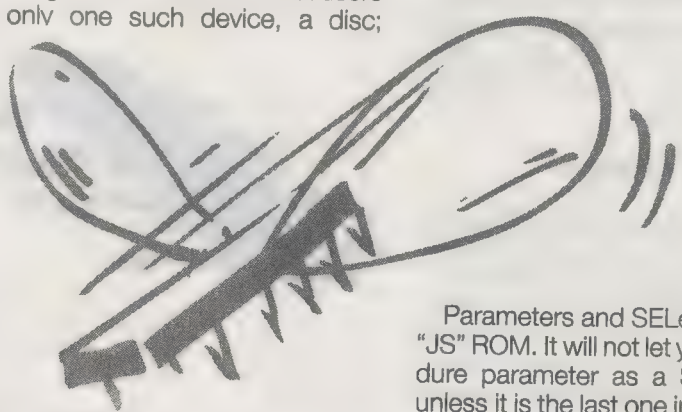
The "JS" ROM killed several annoying bugs of previous versions. It was the first to let you INPUT strings of more than 128 characters from Basic; it also handles CALL correctly in programs of more than 32K which usually crashed a machine running earlier versions.

The "JS" ROM can change the display mode without setting the ink and paper in SCR windows to black and lets you define new procedures and functions with names you have used previously in the same program.

Machine code programmers will be pleased to find that the bugs in the number-base conversion routines vectors 260 to 270 have been fixed. Task handling is more friendly; you do not have to type Control C to retrieve the SuperBasic cursor when a task stops.

The "JS" ROM is the first version which can link more than one plug-in device into the system when you turn it on. QL devices can use a 256K area divided into 16 slots for ROM and port addressing. Those slots are used by disc controllers, sound boards, modems, and so on. Previous ROMs linked only one device into the first slot, however many were connected.

This bug was not serious. Most users have only one such device, a disc;



expansion RAM does not require a slot. Many peripheral designers avoid the problem by putting a routine to link other devices in their own start-up code, so that the one gadget which is called can look up the others. Such a routine appears in chapter 9 of Andy Pennell's *Sinclair Qdos Companion*.

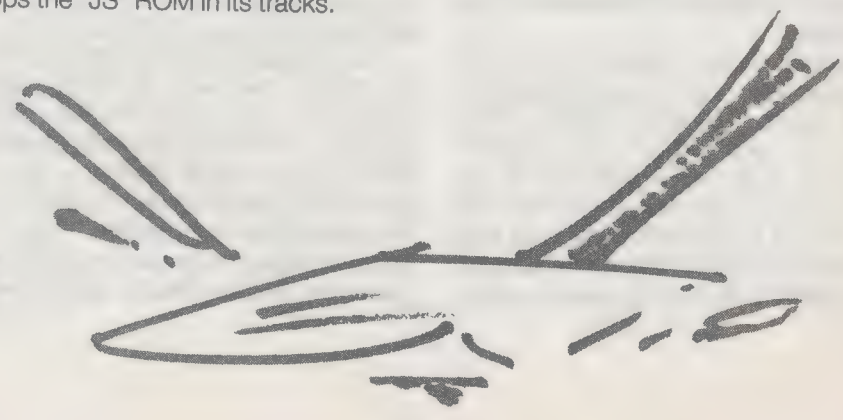
The other changes in the "JS" ROM are less helpful. The revised Basic prevents you entering integer and string SELect statements, which did not work anyway unless you had a compiler. Even the ROM version function, VER$, was a problem. In the process of changing an "M" into an "S", Sinclair stopped VER$ allocating memory for the value it returns. The machine may crash if you try to test VER$ without copying it to a temporary variable first. T$=VER$: IF "JS"=T$ will work will but IF "JS"=VER$ stops the "JS" ROM in its tracks.

Parameters and SELect fell out in the "JS" ROM. It will not let you use a procedure parameter as a SELect variable unless it is the last one in the DEFinition. You must copy the value to another variable to avoid a 'bad name' report.

From the start, QL ROMs contained WHEN keywords to trap errors and monitor variable values. At first they did nothing at all; on ROMs from "JS" onwards they sometimes work and sometimes they just crash the machine.

Sinclair has been understandably reluctant to explain how WHEN trapping should work, as it never produced a QL ROM which can do it properly. Apparently it persuaded Jan Jones, author of the interpreter and *The Definitive SuperBasic Handbook*, to omit a chapter on WHEN handling from her otherwise-definitive tome.

The idea is to put a WHEN ERRor statement somewhere in your program, followed by program lines to be executed in the case of an error, and



rounded off with an END WHEN statement. The computer keeps track of the most recent WHEN ERRor block and jumps into it if an error occurs, without printing the usual cryptic message or stopping the program.

You check the line and type of the error by reading the values of new functions ERLIN and ERNUM. ERNUM returns internal error codes between -1 and -21. Other functions let you check for a given error, without knowing the internal code; ERR NC is true if the error was 'not complete', ERR BN indicates bad name' and so forth. Unfortunately someone typed a BRA where they should have put a BSR, so any attempt to check ERR DF, 'drive full', crashes the "JS" ROM.

The new REPORT procedure prints standard error messages. If you already use that name, or any of the other new ones, in your Basic, you will have to change it. REPORT on its own indicates the last error with a message to channel 0. Codes from -21 to -27 call up other text; REPORT -24 gives 'F1..Monitor F2..TV', for example.

No check

There is no check on the number you supply but only 27 messages are in the standard format, so beware. REPORT -28 and its brethren print a very long string of gibberish. REPORT 1,-19 prints 'not implemented' to channel 1; -19 is the polite code a routine should use to indicate that it does not work yet.

The code for WHEN ERRor is not usually that kind. Errors in functions often crash the machine if WHEN trapping is in force; SQRT of a negative expression will do the trick, as will INKEY$ at the end of a file.

WHEN ERRor is extremely persistent you can type LOAD or NEW and the computer will still try to trap your errors to a non-existent routine. Similar problems occur if you delete an active WHEN statement or type one as a direct command.

Tony Tebby's Supertoolkit clears WHEN after commands like NEW and LOAD and fixes the ERR DF mistake but it cannot help with the other problems. The Digital Precision Turbo compiler gives you reliable WHEN ERROR trapping anywhere in a program, on all QL versions, but of course it does not fix the interpreter.

Another WHEN option in the "JS" ROM lets you monitor variable values. A block starting WHEN VAR>10 will be executed only when the condition becomes true; every time VAR is set Basic checks the new value and calls the WHEN routine if the value of VAR exceeds 10. Unfortunately this does not work reliably on any QL version either; sometimes it gives a 'bad name' report or calls the routine more than once.

The last new command for the "JS" ROM is TRA. This makes it easier to customise QL software for use in other countries. TRA normally has two parameters. The first points to a table to be used to TRAnslate characters sent through the serial ports and the second is the address of a new error-message table. Both tables must start with the 'nonsense' word value 19195, which crops up all over the QL system as an indication that 'data follows'.

The next two words in the serial table contain the offset to two translation lists, measured from the start of the table. The first list starts with a 256-byte list of substitute codes for each character code from 0 to 255. When a character is

to be transmitted it is looked up in the table and the code from the appropriate place is transmitted instead; you can translate the QL end-of-line marker, CHR$(10), by POKEing 13, the usual code for carriage return, into the eleventh byte of this list.

Put the value zero into the appropriate slot in the first list if you want to translate one code into a sequence of several characters. They appear in the second list, which the QL uses only when transmitting serial data — there is no time to use it during input.

The second list starts with a byte value, the number of four-byte entries in that list. Each entry after that starts with the code to be translated, followed by three replacement codes. If you need only two replacement characters, the last code in a group should be zero.

The message table is simpler. After the 19195 there are 29 words, each holding the offset from the start of the table to a message. The messages are stored as normal QL strings — a word length, at an even address, followed by the appropriate text. Beware — the last two messages are sequences of three-character day and month names, with no length word. That is why REPORT -28 goes haywire.

If either parameter of TRA is zero the corresponding table is left alone. TRA 1 sects the standard message table and allows characters to be transmitted through the serial ports unmolested.

Turbo Toolkit contains an example program which uses TRA to translate Sinclair error reports into plain English; other TRA demonstrations have been printed in the user-group magazines *Quanta* and *Quaser*.

A special version of the "JS" ROM was produced for American QLs, which must be compatible with the rather feeble National Television Standards Committee TV standard. The American ROM had a three-letter name, "JSU"; it contains all the "JS" ROM bugs and features, plus changes which you should bear in mind if you develop programs which may be used in the States.

An American television set can display only 192 lines of pixels. In TV mode the American QL hardware ignores the first and last 32 lines of screen memory; in monitor mode it works with the usual 256 lines. American QL owners can swap between U.K. and U.S. TV lineage by POKEing 1 or 2 to address 163890 and typing NEW.

You still get 20 lines of text into a standard TV mode window, as the character set in the "JSU" ROM has been crushed vertically. Characters are drawn on an 8 by 5 dot matrix, rather than the 10 by 5 used on European systems. In monitor mode the crushed characters are still used but they are spaced by an extra two blank lines; rows of text are the normal height but look like a ransom note.

Another change compensates for the different shape of dots on an American display. The QL graphics co-ordinate routines compensate for the shape of each dot so that circles do not look elliptical and squares do not appear as rectangles. Routines which use pixel co-ordinates, such as WINDOW and BLOCK, do not perform any compensation, which is why vertical and horizontal units are different.

Atlantic ROMs

European and American ROMs use different compensation factors, so that graphics shapes look the same on either side of the Atlantic. Unfortunately there is no way to compensate for the difference in BLOCK and WINDOW shapes. Many programs use a mixture of graphics and pixel co-ordinates; they may look satisfactory on one side of the Atlantic but they will not line-up properly across the water.

Things are still tricky, even if you stick to one co-ordinate system. If you work entirely in graphics co-ordinates your shapes will not be distorted, although

they may escape off the edge of the screen. If you use pixel co-ordinates everything will fit on the display but the vertical and horizontal proportions will be different on an American screen.

Sinclair's last fling was Qdos version 1.13, which usually crops up in "MG" ROMs. They have never been supplied in the U.K. although the chips work well in a British machine. The "MG"ROM has only one new bug and kills several important faults in previous versions.

First, the new bug. The "MG" ROM line-drawing routine does not always plot the point at the end of a line or arc, so that one-pixel gaps may appear at the corners of graphic drawings. If that disturbs you, a 'patch' program to correct the bug is available free from Qsoft, PO Box 56, DK 4000, Roskilde, Denmark. Send a disc or cartridge for the program and an international reply coupon for return postage.

Serious bug

The most serious QL filing bug has been fixed in the "MG" ROM. The Microdrive system does not hang up, stalling the computer, if file access is performed when the system is very short of memory. The QL file system uses spare RAM to buffer information en route between Microdrives and your program. The "AH" and "JM" versions could get stuck in a loop if the free memory fell to 1K, because the multi-tasking Microdrive handler would over-write the current block with new information before the application program had time to digest the original data. That is a common cause of failure when RAM-hungry Psion packages are used.

Sinclair tried to cure the problem in the "JS" ROM but managed only to fudge things so that all was well until there were just 512 bytes of free RAM — not much of an improvement.

Unless you have an "MG" ROM, it is worth performing a check for free memory before Microdrive access. This function returns the amount of space free for Microdrive buffering:

```
DEFine FuNction BUFFER
SPACE RETurn PEEK L(163856)
-PEEK L(163852)
END DEFine BUFFER SPACE
```

The "MG" ROM is the first to be able to close the second serial port, SER2. Earlier ROMs used to close SER1 instead whenever you tried to close SER2.

Apparently the "MG" ROM is the first to work correctly on a QL with eight Microdrives. I suspect such systems are rare, even though Spectrum Microdrives will work if plugged into the QL extension drive socket. It is claimed that earlier ROMs used to forget about MDV2 after you had used MDV8.

"MG" SuperBasic has been thoroughly spring-cleaned. You can use any number of parameters and LOCALs in a procedure or function. Previous versions of the Basic allowed only enough space for nine such names. If you used more, the program could lock up or be corrupted by the appearance of spurious PRINT keywords in place of names towards the end of the program. That knowledge may help you to spot program listings which were improved by their authors, untested, before publication.

The "MG" system is less prone than its predecessors to use up RAM as a program runs. Earlier ROMs lost track of some memory every time a slice of a dimensioned string array was passed as a parameter — PRINTed, for instance. If that happened in a loop, as usual, the program ran slowly, constantly grabbing more and more memory, until it failed 'out of memory' discarding all variable values. "MG" does not get into this state.

The only way to recover memory lost in this way was to enter CLEAR or NEW,both difficult to do in a running program. You could avoid the problem by copying slices to temporary, undimensioned strings but that is a slow and messy solution.

The RENUMber routine in the "MG" ROM can cope with RESTORE statments at the start of lines containing DATA. Earlier ROMs used to RENUMber DATA elements as if they were line numbers. This bug was a hangover from the days of the kludge – the original RENUM totally ignored RESTORE.

Any channel

The "MG" CURSOR command lets you use graphics co-ordinates on any channel. Other ROMs let you use only four co-ordinates with the default channel, channel 1. DATA values in brackets no longer cause the other items on the line to be ignored. CLS and PAN can cope with windows narrower than the cursor.

String comparison works properly on characters with ASCII codes greater than 127. Previously you had to check the CODE of the character, rather than compare the string correctly, to check reliably for cursor, function and other special keys.

The WHEN routines are still unfinished in the "MG" ROM, although the trivial ERR DF bug has been fixed. Daft parameters no longer upset READ and INPUT and you can OPEN and CLOSE channels *ad nauseam* without the system complaining; older ROMs limited you to 32,767 OPENs in a session, which used to upset dreadful programmers.

The "MG" ROM was designed for use in continental Europe and is in several versions, with key layout, characters and messages customised for different nations. The 32K ROM is the same for each country and the 16K ROM holds all the information, which varies between versions. VER$ has an extra letter at the end, to show the country — "MGE" for Spain, or "MGS" for Sweden, for example. The dot in the Qdos version is replaced by the country-code letter.

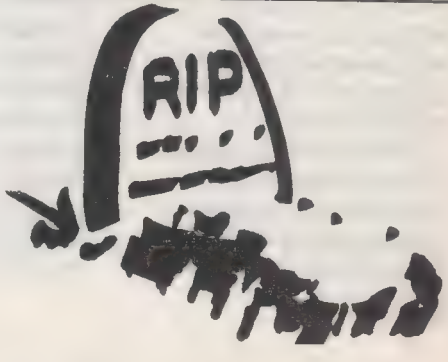
If you want to use a foreign-language "MG" ROM it is easy to create a new set of error messages using TRA but that may not be sufficient. The French "MGF" ROM expects a particularly odd key layout. "A" and "Z" swap places with "Q" and "W", so the layout, like that of French typewriters, is known as AZERTY rather than QWERTY. The "M" key is moved to where "," is normally found, and the "£" key works as an extra shift, putting a circumflex accent or an umlaut over the next vowel typed. Several other characters are shuffled to make space for accented letters.

The last Sinclair effort was the Greek ROM. It works well in the U.K. as soon as the error messages are changed from their heiroglyphic Greek form which, to be fair, is about as clear as the original English. These ROMs use Qdos 1.13 but they are further developments of the "MG" ROM and cannot be mixed with other Qdos 1.13 chips. Greek ROMs display their version as "Sigma FP",although the chips are marked "EFP";presumably the Sinclair Mexican chip makers could not find a sigma stamp.

The "MG" ROM is a great improvement on its predecessors but even so it contains 30-odd unfixed bugs. Next month I will list them and explain how to circumvent them.

All the QL ROMs from JM onwards, including JSU, are plug-compatible. All you need to do the change versions to disconnect the power and replace the components in sockets IC33 and IC34 with a different version.

"AH", "JM", "JS" and "MG" ROMs are available in Europe from Adman Services, 53 Gilpin Road, Admaston, Telford TF5 0BG. Remeber that the wiring of the ROM sockets must be changed if you switch to or from version "AH". The American "JSU" ROM is supplied by Curry Computer, PO Box 5607, Glendale, AZ 85312-5607, U.S.A.



BETTER BASIC

Some practical menu systems programmed by Mike Lloyd.

Menus lie at the heart of many programs, both serious and recreational, and can be the deciding factor between a successful piece of software and a failure. In last month's Better Basic some of the theories behind menus were examined. This month the focus remains on menu systems but the emphasis is on the practical aspects of programming a menu in SuperBasic.

To give some purpose to the example menus, they combine to produce a simple Epson-compatible printer driver but the main intention is to demonstrate different techniques rather than to produce an exemplary piece of software. To show the menu selection routines to their best advantage some unusual choices are offered and user-friendly aids are kept to a minimum. Nevertheless, the program is fully error-trapped and does a useful job, albeit in a somewhat cumbersome fashion.

The printer driver is a character string filled with printer control codes. Listing one establishes the string and starts it with the control code to re-set the printer to its default settings. To save some programming space, the ESCape code is represented by the string *esc$*.

The procedure calls each of four menus in turn to allow the user to select various printer options. A channel is then opened to the printer and a baud rate selected. The complete control code string, *code$*, is then passed to the printer, followed by the control code, which activates the printer buzzer to confirm that the task has been completed.

Listing two demonstrates the cursor bar method of menu selection. A series of options is displayed on the screen, one of which is covered by a coloured bar. The bar can be moved up and down the list and a selection is made by pressing the ENTER key when the bar covers the desired option.

The system allows only one choice to be made, so the options displayed are mutually exclusive. The example routine invites the user to select one of the international character sets. The list is read from DATA statements and displayed in the listings window. To allow the bar to over-write itself, the window is placed into XOR mode with the command *OVER#2, -1*.

The cursor bar is produced by a BLOCK command. The size and position of the bar are calculated using the pixel co-ordinate system; changes in character sizes should be reflected in the parameters of the BLOCK command. After the bar has been drawn once the routine pauses for the keyboard to be read. The decision to use KEYROW rather than INKEY$ was taken so that the speed of the routine was maximised. KEYROW is really suitable only to poll the cursor keys or the function keys as KEYROW values are otherwise highly disorganised.

Once a key has been pressed the cursor bar is over-drawn and therefore disappears. If the up or the down cursor key has been pressed the cursor position is altered. The logical expressions in lines 248 and 252 prevent the bar going above or below the list of options. If the ENTER key is pressed the routine adds the appropriate control codes to *code$* and the screen XOR is cancelled.

This type of menu is most efficient where there is a relationship between an option's value and its position in the menu. Here, the options are placed in numerical order so that the final cursor position could be translated directly into the correct control code.

The function keys are ideal for small menus, although on the QL this effectively limits a menu to only five options. Although different ASCII values can be obtained by combining the function keys with the SHIFT, CTRL or ALT keys, such combinations are usually too cumbersome to be of practical value. Listing three shows a function key menu of five options which allows the user to select a typeface. Once again, the user must make a single choice. There is no default setting and the ESCape key is not polled.

The routine begins by adding CHR$(27) to the printer driver string in anticipation of a full control code. The options are displayed on the screen in a similar manner to the previous menu list, except that each option is preceded by the appropriate function key. The loop counter provides the function key number.

The function keys are polled using the INKEY$ facility rather than KEYROW, simply to ring

Listing 1

```
100 DEFine PROCedure SET_PRINTER
105 LOCal esc$, code$
110 esc$ = CHR$(27)
115 code$ = esc$ & CHR$(64)
120 menu_1
125 menu_2
130 menu_3
135 menu_4
140 OPEN#5, ser1: BAUD 9600
145 PRINT#5; code$ & CHR$(7)
150 END DEFine SET_PRINTER
```

the changes. The raw ASCII code is manipulated in line 336 to produce an integer between one and five. That makes life easier for the programmer because it is immediately obvious which part of the SELect structure refers to which function key. The polling loop can be left only if a valid key is pressed, thereby error-proofing the routine.

The select structure adds the appropriate control characters to *code$* and the routine is then complete.

Many programs require the user to give yes/no answers to questions and lazy programmers are often content to repeat lines of code each time such a question occurs rather than establish a single procedure or function to test for the user's response. Unfriendly programs may even use INPUT commands so that the user must follow each keypress with ENTER.

The menu at listing four asks the user to select up to four print styles. Any combination of styles can be chosen, although a few will not be implemented on the printer, and each choice is a binary decision, i.e., on or off, and so a series of yes/no questions is an appropriate way of presenting the choices.

The routine was simplified by using a user-defined function — at listing five — which returns 1 for a

Listing 2

```
200 DEFine PROCedure menu_1
204 LOCal ypos, loop, key, n, text$
208 CLS#2: CSIZE#2, 0, 0: RESTORE 200
212 PRINT#2; "Select Character Set:"\\
216 FOR n = 1 TO 8: READ text$: PRINT#2; text$
220 ypos = 2: OVER#2, -1
224 REPeat loop
228   BLOCK#2, 60, 10, 0, 10*ypos, 7
232   PAUSE: key = KEYROW (1)
236   BLOCK#2, 60, 10, 0, 10*ypos, 7
240   SELect ON key
244       = 1: EXIT loop
248       = 4: ypos = ypos - (ypos > 2)
252       = 128: ypos = ypos + (ypos < 9)
256   END SELect
260 END REPeat loop
264 code$ = code$ & esc$ & "R" & CHR$ (ypos - 2)
268 OVER#2; 0
272 DATA "USA", "France", "Germany", "UK"
276 DATA "Denmark", "Sweden", "Italy"
280 DATA "Spain", "Japan"
284 END DEFine menu_1
```

KEYWORD OF THE MONTH

One mark of a modern program editing system is the presence of a command to re-number program lines. This is a useful facility for keeping listings tidy or for creating space for new program lines. The QL re-numbering command is surprisingly complex.

At its simplest, RENUM has no parameters and, when entered as a direct command, it re-numbers the whole program to begin at line 100 with an increment of 10 between successive lines. An expression, normally an integer constant, following RENUM indicates the new starting line number. A second optional parameter, separated from the first by a comma, can be used to specify the increment between line numbers.

Further complications occur when only a portion of a program is to be re-numbered. The syntax for the full RENUM command is:

RENUM (span) ; start , increment

(span) indicates a span of lines on which RENUM will act. The default span is the whole program, i.e., lines 1 to 32767. Spans can be specified in the following ways:

600;	= Lines 600 to 32767
600 TO;	= Lines 600 to 32767
TO 900;	= Lines 1 to 900
300 TO 700;	= Lines 300 to 700

Start is an integer which indicates the line number to be adopted by the first line in the span; the default is 100.

Increment indicates the increment between line numbers; the default is 10.

Any element of the command can be omitted and its default will be assumed. Correct punctuation is essential if the interpreter is to know what element a parameter represents. A number followed by a semicolon is assumed to be a span and a number preceded by a comma is assumed to be an increment. Thus *RENUM*, 5 will re-number a program beginning at line 100 with increments of 5 but if the comma was omitted the parameter would be assumed to represent the start number and re-numbering would begin at line 5 with an increment of 10.

RENUM does not allow the programmer to re-number program lines out of their original sequence. Error messages also occur if re-numbering would cause lines to be over-written. RENUM does not allow lines to be re-numbered lower than 1 or higher than 32767, which is the highest valid line number.

RENUM will re-number GOTO, GOSUB and RESTORE commands correctly unless their parameters are expressions, such as GOTO X*5 + Y. If, however, the expression takes the form of:

*RESTORE 500 + X * Y*

RENUM will alter the constant, in this case 500, provided that it is the first part of the expression.

The User Guide warns that RENUM should not be included in programs. A problem with early QL ROMs sometimes caused the interpreter to lose its place if a RENUM occurred but by the time the JS ROM was released the problem had been cured. RENUM, however, like other editing commands, cannot be used within a procedure. That said, it is uncommon to find a useful role for RENUM within a program.

"yes" response and 0 for a "no" response. It consists of a simple loop and two IF statements to trap the *Y* and *N* keys in either upper- or lower-case. Other keys are ignored but the routine could be amended so that, for example, *ENTER* and *ESC* become alternatives for *Y* and *N* respectively if required.

Many options

The example application requires action to be taken only if the answer to a question was "yes" but an alternative action for a "no" response could be programmed using a full IF . . . THEN . . . ELSE . . . END IF structure.

The final menu system is an example of one which can be most difficult to program. Such a wide number of options is involved that the programmer is forced to use the INPUT statement. In this example, the left and right margins are set. The routine asks the user to declare values for the left margin and the text width and then translates the user's responses into the appropriate printer codes.

Once again, a function is used to make the menu easier to program. *Choose* — listing seven — returns any value between upper and lower limits set by the function's parameters.

BETTER BASIC

Simple error-trapping is achieved by inputting a string which is coerced into a numerical value. Non-numerical characters are read as zero. If a choice is made which lies outside the parameters the error message "INVALID" is printed and the user must enter another value. A valid choice is returned to the originating expression.

After calling *choose* to establish the left margin width the routine calculates the maximum text width, assuming an 80-character printout. This modicum of intelligence ensures that a margin/text combination does not exceed the maximum number of character spaces allowed by the printer. The routine thereby follows the precept that the user should never be required to do the computer's thinking for it.

Other methods

These four examples of menu routines are by no means the only methods of displaying choices. There has not been space to include the mnemonic method which is so frequently used in Psion programs. Other menu systems can be very specialised or complex and the intricacies of a hierarchical menu tree have not been explored. Nevertheless, these four examples should, with a little modification, cover most programmers' needs.

Listing 3

```
300 DEFine PROCedure menu_2
304 LOCal loop, key, n, text$
308 CLS#2: RESTORE 300
312 code$ = code$ & esc$
316 PRINT#2; "Select typeface"\\
320 FOR n = 1 TO 5
324   READ text$: PRINT#2; "F"; n ! text$
328 END FOR n
332 REPeat loop
336   key = INT ((CODE (INKEY$(-1)) -228) /4)
340   SELect ON key = 1 TO 5: EXIT loop
344 END REPeat loop
348 SELect ON key
352   = 1: code$ = code$ & "("
356   = 2: code$ = code$ & "P"
360   = 3: code$ = code$ & "M"
364   = 4: code$ = code$ & "P" & esc$ & "4"
368   = 5: code$ = code$ & "M" & esc$ & "4"
372 END SELect
376 DATA "NLQ (10 cpi)", "Pica (10 cpi)"
380 DATA "Elite (12 cpi)", "Italic (10 cpi)"
384 DATA "Italic (12 cpi)"
388 END DEFine menu_2
```

Listing 4

```
400 DEFine PROCedure menu_3
405 CLS#2
410 PRINT#2; "Enlarged? (y/n)"
415 IF yes: code$ = code$ & esc$ & "W" & CHR$(1)
420 PRINT#2; "Proportional? (y/n)"
425 IF yes: code$ = code$ & esc$ & "p" & CHR$(1)
430 PRINT#2; "Double Strike? (y/n)"
435 IF yes: code$ = code$ & esc$ & "G"
440 PRINT#2; "Condensed? (y/n)"
445 IF yes: code$ = code$ & CHR$(15)
450 END DEFine menu_3
```

Listing 5

```
500 DEFine FuNction yes
510 LOCal loop, key$
520 REPeat loop
530   key$ = INKEY$(-1)
540   IF key$ == "y": RETurn 1
550   IF key$ == "n": RETurn 0
560 END REPeat loop
570 END DEFine yes
```

Listing 6

```
600 DEFine PROCedure menu_4
610 LOCal left, right
620 CLS#2
630 PRINT#2; "Set left margin (0 - 50)"
640 left = choose (0, 50)
650 code$ = code$ & esc$ & "1" & CHR$ (left)
660 PRINT#2; "Set text width (10 - ";
80 - left; ")"
670 right = choose (10, 80 - left)
680 code$ = code$ & esc$ & "Q" & CHR$
(left + right)
690 END DEFine menu_4
```

Listing 7

```
700 DEFine FuNction choose (min, max)
710 LOCal loop, value, val$
720 REPeat loop
730   INPUT#2; val$: value = 0 & val$
740   SELect ON value
750     = min TO max: RETurn value
760   END SELect
770   PRINT#2; "INVALID"
780 END REPeat loop
790 END DEFine choose
```

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PYRAMIDE OFFER

There are no give-aways this month but we have something that everyone can take advantage. We have managed to persuade Pyramide to offer some of its software packages at very special prices, exclusively to readers of *Sinclair QL World.*

Wanderer, Mortville Manor and *Nucleon,* which normally cost £17 each are available for only £12. you can save £7 on the usual asking price for *Graphic Toolkit* which is only £16.

All the software has been reviewed in previous issues. of *Sinclair QL World* but for those who missed out, here is a little of what we had to say.

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Copies of Graphic Toolkit	@£16 each. Total	.....
	Sub Total	.....
	Post and packing 75p	
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I am a QL Gold card holder and have deducted £1 from each order. My card number is .....

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Greencoat House
Francis Street
London SW1P 1DG.

Please allow 28 days for delivery.

Graphic Toolkit

Very much up to the standard set by other Pyramide graphic products such as *QL Peintre* and *Nuclean,* Graphic Toolkit is an invaluable aid for providing a slick, professional finish to any program.

Nucleon

One of the most exciting utilties I have examined, the Pyramide *Nucleon* incorporates a suite of routines which enable you to produce windows, "music" – such as that of which the WL is capable – a generator for character, graphic and icon fonts and memory-conserving graphics and includes the option of generating SuperBasic programs at the end of each section for use in your programs.

Mortville Manor

Is made more enjoyable by the very good graphics and the tremendous attention to detail, for example the light which casts shadow in the bureau. The graphics greatly enhance the atmosphere of the Manor and provide every budding detective with ample opportunity to glean useful clues.

Go for Gold

If you applied for a QL Gold card in March, now is the time to use it. Gold card-holders can obtain a further £1 discount on each of the packages. Do no forget to write your card number in the space provided on the form.

TURBO *v1.14*

"Dramatic . . . . bug free . . . . an excellent program . . . a great advance on Supercharge . . . . more capable (than the latest version of QLiberator) . . . . the fastest SuperBASIC compiler so far . . . . mind-bending . . . . takes SuperBASIC and the QL into a new era . . . . With TURBO we should start to see programs which are unthinkable on any other small micro"
QL WORLD, April 1987

STANDARD	PERSONAL 1	COMPUTER 2	WORLD 3	BENCHMARKS 4	5	6	7	INT MATH	REAL MATH
SuperBASIC	1.7	4.8	7.9	7.7	10.0	20.2	36.5	10.4	13.2
TURBO (float)	0.1	0.2	0.5	0.7	0.8	1.7	2.4	n/a	0.6
TURBO (int)	0.05	0.08	0.2	0.15	0.25	0.55	0.9	0.15	n/a
vs SuperBASIC	3400%	6000%	4000%	5100%	4000%	3700%	4100%	6900%	2200%
vs QLIB v3.x	200%	500%	350%	470%	300%	240%	240%	300%	230%

* ALL tests performed on JS QL + Sandy 512K expanderam - ratios with AH/JM QLs or faster RAMs are even more favourable to TURBO. QLiberator was set for its maximum speed. The benchmarks tell a remarkable story - TURBO produces code that typically runs THREE HUNDRED PERCENT faster than does the QLiberator interpreter. The figures are crushing - its like comparing a Lada with a Lamborghini (but without the price differential)!

STOP PRESS! stop press! STOP PRESS! stop press! STOP PRESS! stop p In the May/June 1987 issue of FORUM, QLiberation provided their own demo benchmark - chosen, written & compiled BY THEM... Shame they didn't test it with TURBO! The TURBO'd code is not only more concise but is OVER FOUR HUNDRED PERCENT FASTER! Ouch!! Proof has been lodged by DP with QL WORLD and its troubleshooter. Other painful (to them) examples include simple string concatenation (10 DIM A$(32000) 20 FOR I=1 TO 32000:A$=A$&"X") where TURBO is an amazing TWO THOUSAND ONE HUNDRED PERCENT faster than QLib.

* Many users have compared DP with Borland,the leading software producer for IBM clone machines. We are not that flattered, as comparing our TURBO QL benchmarks with BORLAND's TURBOBASIC shows that we are 15 times (6X on floats) faster than they are!

Here are some of the companies who have benefited from SUPERCHARGE/TURBO technology: QL USER/WORLD * QUANTA * CST * DS * EIDERSOFT * PSQL * PYRAMIDE * DARSOFT * ULTRASOFT * MD * MIRACLE * HISOFT * SHADOW * TRANSFORM * CURRY * ABC * SECTOR * TESSERACT *

COMPATIBILITY: TURBO will intelligently compile any correct SuperBASIC program (except for interpreter-only words like EDIT). Unlike the interpreters (the one that's free and the other one) TURBO does not blindly accept dangerous rubbish (eg: 10 DEFPROC NAME1 20 REP LOOP 30 ENDDEF NAME1 40 ENDREP LOOP - try this in SuperBASIC!; TURBO autocorrects bad programs. Both interpreters are rather stupid - they are unaware of faults, with the result that programs often run erratically (FREE ON RECEIPT OF AN ORDER OR AN SAE - DP's "LIST OF SIXTY WORST INTERPRETER BUGS"). The sad fact is that your interpreter not giving an error message is NO GUARANTEE that your program is working in the way that you think it does... For safe programming you simply can't do without TURBO.

☆ Supremely easy to use – a beautiful front-end, on-screen help, instant abort, no LENSLOK, window adjustable during compilation, multitasks while compiling, adjustable buffer size/window copying/DATASPACE from front-window, user configurable to avoid boring keybashing, adjustable report file (to screen/printer/file etc.) in full or condensed format, etc.

☆ Supremely flexible task communications – use PRINT and INPUT to communicate between any number of multitasking jobs – even arrays can be passed, and channels can be shared. Option strings can be passed as parameters of EXECUTE.

☆ Supremely free from restrictions – you can use procedures or functions in any task from any other task! Generate tasks as large as the QL's 640K RAM – or go down the modular route (we supply a program to help you) and instantly link

☆ Supremely Servile (!) – TURBO lets you choose between switching diagnostics on/off (off = shorter code), and between setting optimisation to global speed/localised speed (on a statement block basis) * size * size with localised speed * none, a total of 15 options. You are in the driving seat. If you slip up, we give you a report that pinpoints your mistake, exact to the character!

☆ Supremely feature-filled: Virtual arrays, rubber arrays, implicit datatypes (accelerated, fully re-entrant integer FOR loops and integer/STRING SELECT on all QL s), full WHEN – ERROR trapping of any error on any QL version to a single point (error handlers – you can have any number of them, hierarchically laid out – have full access to line and error numbers, and you can RETRY or CONTINUE (RESTART as you choose) even when in another task, parameter passing by reference as well as by value, 9 digits of displayed accuracy, etc.

☆ Supremely powerful **TOOLKIT** included, with **ONE HUNDRED AND EIGHTY (!!!)** really useful commands, utilities and functions for the BASIC programmer. There is no space to even begin to list them – suffice it to say that **TURBO TOOLKIT**'s most 'comprehensive' rival has little more than half as many features. The **TOOLKIT** (which is RAM based) is designed to complement existing toolkits (e.g. the Supertoolkit)

☆ Supremely documented – a **THREE HUNDRED AND FIFTY A4 PAGE.** lucid, illustrated user encyclopedia

☆ Supremely generous – there are no royalty restrictions on **TURBO**'d programs.

The TURBO System costs £99.95 COMPLETE

TURBO IS BRILLIANT PRESS COMMENT FROM EVERY SOURCE IDENTIFIES IT AS THE MOST OUTSTANDING BASIC COMPILER FOR ANY MICROCOMPUTER.
The TURBO TOOLKIT is perfectly usable as a stand-alone toolkit, and costs just £29.95. This amount will be credited if you subsequently purchase THE TURBO SYSTEM.
"You are getting good value, and there is a lot more . . . TURBO TOOLKIT is a comprehensive product which will not leave you wondering where your money went – it offers a wide range of facilities to everyone (whether or not they own a compiler)!" . . . QL World, December 1986

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POPULAR COMPUTING WEEKLY

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"Superb . . . . it exceeds feature specifications found in even the best word processors presently available . . . . natively multitasking . . . you will actually look forward to using Editor (this never happened with Quill!) . . . . you are in complete control . . . . seldom have I ever come across a program which positively scintillates with such due care and attention" . . . . *QL World, January 1987.*

The Editor is amazing – a few of its features are summarized below:
☆ Speed improvements of the latest edition of the EDITOR over Quill are simply ridiculously good – load-time improvements of 25 times, block-handling improvements of over 100 times, deletion improvements of 50 times, searching improvements of 100 times, paging improvements of 100 times, copying improvements of over 1000 times, etc.
☆ Flexible – Editor can load and handle text, Quill documents, SuperBASIC programs, listings in assembler or high level languages, QL screens, data files, machine code object files, alien format files caught by Media Manager, even Editor itself(!) – and you choose your own fonts too
☆ Feature-packed – an independent count of features yielded QUILL 14, METACOMCO ED 17, **EDITOR 65** (!!) (Ask DP for a factsheet if you are a sceptic!)
☆ Here's a mind blowing option – Editor allows you to create command files (using ANY/ALL of the 102(!) commands) for subsequent execution. In the SPECIAL EDITION, these command files can have up to nine parameters each . . pause & think what can hence be accomplished!
☆ Friendly – with full on-screen help and a very flexible configurator giving you access to everything (screen shape, size, position, three ink colours, three paper colours – even the characters to act as delimiters for word searching or replacing!)
☆ Now with a new all-singing, all-dancing printer driver – lets you start where most Editors stop!
☆ Lucidly documented – new larger manual

The multitasking PRINTER DRIVER allows multiple line headers & footers, pagenumbering (variable offset/start no), ALL possible style/font options, spooling – even pause for daisywheel change!

A superb spelling checker for Editor (30000+ word vocabulary!) is available at a cost of just £29.95

EDITOR costs £29.95

With many more features SPECIAL EDITION EDITOR costs £39.95 and needs extra RAM

EYE-Q *v2.1* The Definitive QL Graphics/CAD System

Fully driven by pop-up menus * single key entry * several zooms * windowing * proportional movement * paint/fill * rubber bands * arcs * ellipses * circles * lines * files * replicable sprites * horizontal & vertical stretch * reflect * invert * transfer * pan/scroll * undo (ie; whoops!) * font design editor * automatic anti-aliasing * graphic screen compression * offset display * on-screen help * XOR/OR cursor with variable width * paste * recolour * magnify * reduce * text inclusion * freehand movement * [illegible] save/load/scroll/pan/recolour/zoom * integral font editor * full range of QDOS colours & stipples available through paintbox * user-definable defaults * 2 fonts supplied(amazing 4 colour airbrush * user definable printer driver (user sets proportionality, graphic mode, density etc) – hundreds of printers supported * improved fill and compress * 3 text modes plus toggle off * rubber band boxes and own screens * full compatibility with SUPERCHARGE, TURBO, SGC V4.0, joysticks + TURBO TOOLKIT * monochrome save * localised options on all full-screen operations * user switchable resolution * SuperBASIC extensions supplied free *

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EYE-Q is fully compatible with DP's new DESKTOP PUBLISHER
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"The sprites produced are very good" **POPULAR COMPUTING WEEKLY**
"Excellent" **THE U.S. QL REPORT**
"The results that can be achieved are excellent" **ELECTRONICS & COMPUTING**
Most QL games on the market are written using Super Sprite Generator . . now you can get the same effects!

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The full multitasking, stand-alone, high speed FORTH-83 system is now supplied with an extremely powerful compiled Othello (beat the 1983 World Champion program from MOI!). This latest version has new, extended documentation and full string handling. Now fully compatible with 68000 code & QDOS.
"Succeeds very well" **QL WORLD**
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SUPERFORTH costs £39.95 complete with 100 page A4 manual

SUPERDUMP £19.95

NEW

This amazing new DP release is a must for everyone who wants SUPERB graphic printouts from an EPSON or OKI compatible printer. SUPERDUMP gives you an incredible TWENTY TWO sizes/styles, with user-controllable colours/shades and upto FIVE passes for clarity. Easy to use, multitasking, ultrafast and compatible with EYE-Q (including condensed & part-screen modes) and ALL OTHER graphics packages. Special PCB dump modes included: no more need to buy slow, inflexible, expensive PCB designers – use EYE-Q + SUPERDUMP.
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"An invaluable tool - an excellent package a 5 star (☆☆☆☆☆) program" **SINCLAIR USER**

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"Excellent – a 5 star program" SINCLAIR USER, December 1986
"Intelligent – does well what it sets out to do" QL World, Jan. 1987

BETTER BASIC costs £24.95 complete with manual

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"One-of-a-kind . . . every requirement provided for . . . descriptions such as superb, ultimate, excellent are barely adequate" QL World
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"The best Astrology program of them all" PREDICTION, Europe's leading astrological magazine.
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PROFESSIONAL ASTRONOMER is £10 extra for users of Professional Astrologer. ASTRONOMER has a full planetarium display, a choice of 6 coordinate systems. Moon/Mercury/Venus/Mars actual face displays with real shadows and eclipses, automatic parallax correction (only NASA has this!), solar system display in parallel projection with zoom, tilt, freeze, autoincrement, etc. If not bought at the same time as Astrologer, the price is £12.95.

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* String searching by sector or file – ultrafast
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* Control upto 256 separate cartridges/disks – DIRECTORY of DIRECTORIES
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The old favourite – this acclaimed system automatically translates slow SuperBASIC into fast multitasking machine code. Ideal for those who do not need the full power of TURBO. *"Superfast, Super compact and Super flexible – produces minor miracles – a superb utility – a 5 star program – a Sinclair User Classic (the highest award given to any program)"* **SINCLAIR USER**
"The best professional applications package available extremely impressive . . the quality speaks for itself" **POPULAR COMPUTING WEEKLY.**
"The claimed speed increase over SuperBASIC was substantiated QLiberator lacks Supercharge's finer features and is generally slow" **ZX COMPUTING.**
"A runaway success – SUPERCHARGE is dangerously close to being a completely over-the-top rave! performance is simply dramatic the final spark that sets the QL software scene alight SUPERCHARGE really shows that you can do things on a QL that you can't on other machines" **YOUR SINCLAIR**
"The claims made by DP are completely factual and in some cases understated. I was astonished with the speed incredible . . it really does what it says. The QL is at last forced to live up to its original specification" **QUANTA**

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★★★★★ GAMES ★★★★★

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- UK delivery costs are all-inclusive. Europe add 5%, elsewhere 10% to cover airmail costs.
- Program upgrades can be obtained by sending us the original cartridge (NOT the packaging or documentation) plus £10 (£12 Europe, £15 elsewhere).
- SUMMER BONUS – £1 off if you buy 2 programs, £2 off on 3, £3 off on 4, etc.
- A deluxe stand-alone keyboard is available for £89.95 (it has numeric and cursor keypads) – or just £174.95 if bought together with TURBO. Or get TURBO + ICE £119.95 – or £129.95 including ChoICE.
- The GigaMOUSE system and the GigaSOUND system cost £89.95 each – 10% discount if bought with any DP program.

DIGITAL PRECISION

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Leslie Fahidy introduces a new approach with this regular series

QL EDUCATION...

QL EDUCATION

MONTH ONE:

The Learning Process

Why use a computer?

The new series on educational computing will differ in format and content from the previous one. The series concluded in last month's issue was machine-orientated; it dealt mainly with how to write educational programs for the QL in SuperBasic and it was accompanied by a number of listings, usually one per month.

The new series will be problem-orientated. It will examine the question of why we should want to use the computer — any computer — for educational purposes, followed by a more detailed examination of the fields in education in which a computer may be used for teaching purposes and how best to achieve the objective.

It will also be accompanied by programs but instead of producing a printed listing we will publish the programs in Microdrive Exchange. That makes sense; it permits me to write more complex and more useful programs, without cluttering the pages of *QL World*. It also means that you will no longer have to type-in long listings, with the frustration which results from having to locate a tiny error in a long listing. Should you have queries, suggestions or criticisms concerning the programs, contact me via the Editor. All feedback is useful.

The programs will not be related strictly to the contents of that month's article but, of course, a uniform picture should emerge at the end on how to write good educational software. Here and there I will also refer to commercially-available software.

Phenomenon

Why use a computer? That is a very natural question and not only in connection with education. Both the computer and the learning process are based on the same phenomenon — repetition. Most computers on which ordinary mortals can lay their hands have a very primitive repertoire; they can carry-out the four basic arithmetic operations and a few logical operations, which would not take us long to learn. Of course, there is something else to computers. They can repeat the operations as often as necessary, in any combination and at any time, at phenomenal speed.

The requirements of the learning process are not so different. Once we have acquired the basics, once we can read and write, we are also required to carry-out arithmetic, to decide which path to take in a given situation, to make logical decisions relating to the given circumstances and to follow instructions — those instructions may be our own, based on previous knowledge. In short, because of its very nature of operation, a computer is ideally-suited to help us acquire more knowledge

There are some additional qualities of computer learning which make it the proper tool for the task of teaching. I speak from exxperience when I tell you that I put a great deal of thought into writing an educational program. If I am not familiar with the topic, or the age group, I ask the advice of colleagues concerning the important aspects of the material at which the program is aimed. I would not make the same effort when teaching in the course of my daily routine; I could not afford to do so.

QL EDUCATION

MONTH ONE:

The Learning Process

A further point to note is that in a teacher-learner situation the learner can learn only if the teacher is present and can devote time to that particular pupil. With computer teaching, it is only the machine and the software which need to be available — and the pupil, of course.

Having established the usefulness of computers in education, let me say that the Sinclair QL is a particularly good choice. For a start it is cheap. It becomes an even more attractive proposition when we consider the high-quality software bundled with it. The Basic is excellent and the quality of the four application packages may be measured by the fact that they are available at almost £300 for the PC and compatibles.

Marketing

Even though there have been some errors in marketing it and it has not been a commercial success, it is an excellent machine with facilities far exceeding those on other, similarly-priced equipment. Its only disadvantage is the lack of educational software available for it. There is some, but nowhere near so much as there could be.

I feel we should start by examining the many fields in which computers may be used for teaching purposes, with a brief indication of the methods available. The list is by no means exhaustive so I gathered the most obvious fields of application. Later in the series I will discuss each of the points in detail and many of them will be supported with programs in Microdrive Exchange.

At an elementary level of learning a language, it is mainly a question of repetition. That applies mainly to the learning of vocabulary and also, to some extent, to the learning of rules of grammar. Programs can easily be constructed in Basic to achieve this aim; the greatest problem is the amount of data which the user needs to type-in; after all, a program which gave 20 English words with their say French meanings would not be of much practical use. Publishing the programs, together with their data, in Microdrive Exchange, should ease the situation.

Some clever programming is required to overcome the difficulty of the dual, or manyfold, meaning of some words; the solution is likely to be similar to writing a specialised database in Basic. I intend to produce such a program in the course of the series.

An entirely different approach is needed to teach comprehension. In this area, the student is asked to read a piece of text and answer questions on it in context. Apart from the database method, some logical programming is also needed if questions such as: "Why was the door closed?", "Who brought in the cat?" need to be answered. One could always force a solution by strong-arm tactics by including all the data relating to every question and corresponding answer, but this would be a poor solution, leading to confusion.

Promise

Suppose the expected answer to the second of our hypothetical questions was: "John brought in the cat". If the learner answered it as "Helen's brother brought in the cat", the answer would be rejected, yet it might be true in context. A great deal of thought must go into programs of this kind and I promise to do my best to provide a favourable solution.

Referring to social sciences, I am thinking mainly of history, perhaps the most important of the social sciences which is taught at a level where computer-aided learning is likely to be relevant.

The problem could be approached on a database basis, i.e., a straightforward list of names, dates, names of battles, in answer to straightforward questions. While that approach has certainly been used and is useful at an elementary level of teaching history, I have different ideas.

Research

History can be taught on a computer using the approach of adventure games: "What would have happened if Ceasar did not cross the Rubicon?". "How would we live today if Hitler had won the Second World War?" I feel this approach, while it may not teach the name of a general who won or lost a battle, would teach the learner much more about history. Needless to say, a great deal of research is needed, apart from the programming effort, to write such a program, and I expect that I will find with a suitable solution.

Traditionally, mathematics, science and technology is the most popular field for computer-based teaching but a new approach would be useful. Consider some examples; evaluate an infinite series, or produce an iterated solution to a cubic equation, using a spreadsheet or a spreadsheet-like technique; simulation of natural laws using graphical methods; design projects in various fields of engineering, probably incorporating some of the techniques of CAD on a reduced scale, to make it suitable for learning, rather than carrying-out the task.

Domestic science, taught at secondary level, deserves special mention since it affords so many opportunities for computer teaching. The filing and retrieval of recipes is an ideal field of application for a specialist database. Archive may be used and I am planning to write a command file with this application in mind. We could introduce further complications on the way, such as prepare a menu for a dinner and from the list of ingredients prepare a shopping list, including quantities. How about teaching the learner to price the ingredients and calculate the cost of a meal per person? The teaching of stock control in the larder would also lend itself for this topic.

Graphics

I emphasise that in this project, as well as all the others I have mentioned, I am not just thinking of carrying-out the task, though the program could do that as well. I am thinking mainly along the lines of teaching the learner how to do it, with or without a computer.

Biology has featured in some commercial learning packages but earth sciences are completely absent. Yet try to imagine the beautiful graphics which could be incorporated in a package teaching plate tectonics.

I intend to leave art and music well alone. Not because I do not think that there is room for the computer in those areas but because I do not feel competent to tackle any of the tasks in either.

I wrote this article during the run-up to the General Election and at such times we scarcely need to be reminded of the usefulness of computer methods in politics; we have been saturated with bar charts of various polls and predictions for several weeks. Apart from practical usefulness, computer methods could be equally useful in teaching politics and business studies. In the field of legal studies, probably a different approach will be called for, more along the lines of database applications. I have in mind a command file, written for Archive, with special emphasis on teaching law. The structure of Archive would lend itself to examining the relationships between various pieces of legislation, as well as recording case histories.

QL EDUCATION

MONTH ONE:

The Learning Process

We must not forget the importance of teaching practical skills, or the fact that computers can be put to good use in this field. The difficulty we have to overcome stems mainly from the fact that, due to their very nature, practical skills are not practised on the computer — with the exception of computer skills, of course. That does not mean that the computer cannot be used in helping the learner to acquire skills. Most practical skills are practised with some or all of the following main objectives in mind:

You must know what you are doing, and why. You must recognise the tools and processes. You must know a strict timetable, according to which a process must be carried-out. In case of error you must be able to trace your actions and find what has gone wrong, why it has gone wrong and how it may be rectified.

Most of the actions would not lend themselves easily to demonstration on a computer screen. You could not very well show on the screen how to use a micrometer, to quote one example, but even in this highly practical field you could impart a great deal of useful knowledge, explaining how a micrometer works and how to take and interpret readings.

Computer education is such an obvious contender for our proposed program that I have deliberately left it to the end. With much commercially-available software the distributors include a sample file aimed at showing you how to use it. The field I am discussing now is not only an obvious contender but also a very important one.

Logical

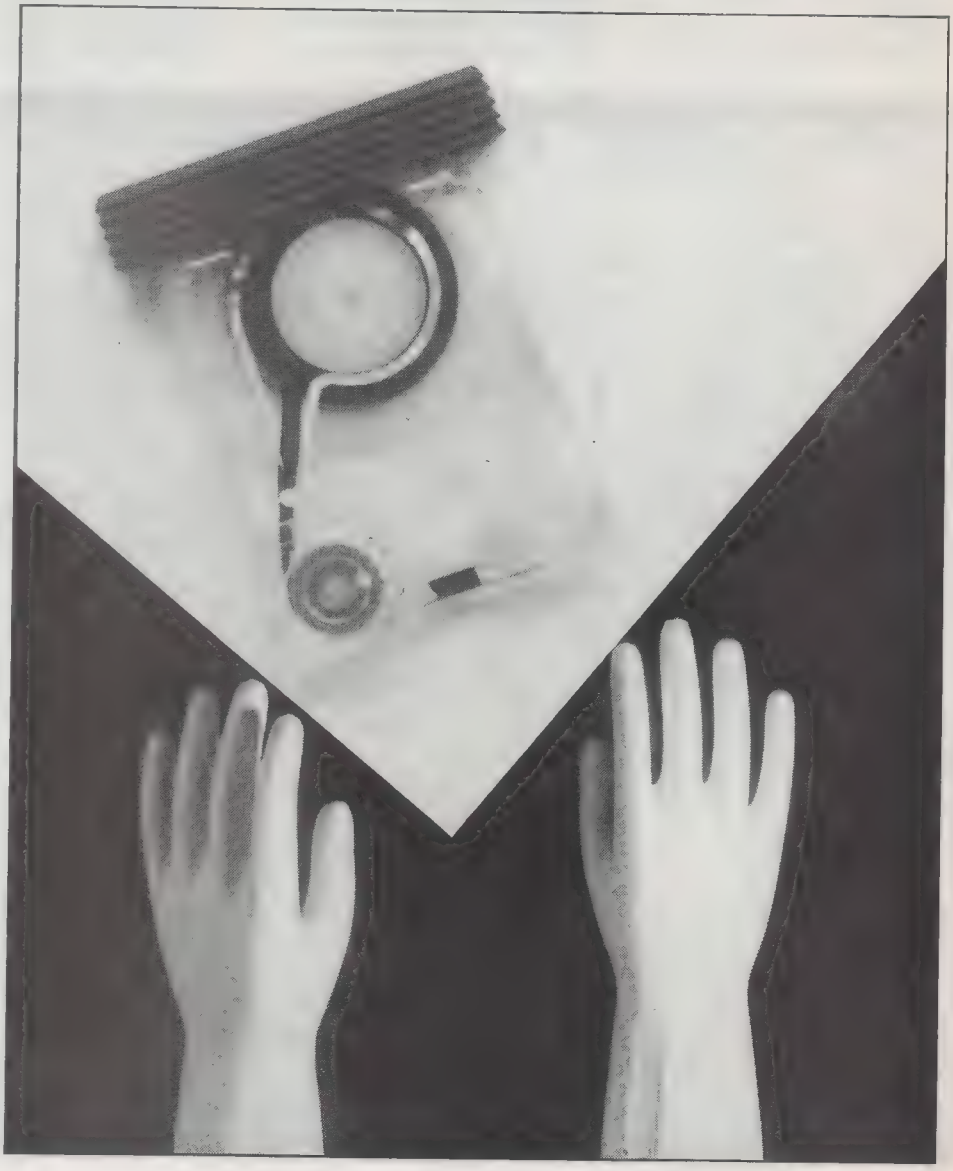
In the timetable of the oft-quoted computer revolution we have reached the stage where an increasing number of people are using more and more complex pieces of software, probably not as a matter of choice. Many of them may not be interested in computers but if they want to earn a living in their chosen field they must be able to operate a word processor or a spreadsheet, a database manager or an accounting package. Equally, we could teach novices to program in Basic, pointing out not only the errors they may have made but also the logical inconsistencies which are bound to creep into a program written by a beginner — and this stage extends a long way in our craft. The Basic language is, to some extent, self-teaching; that is one of the advantages of an interpreted language but a suitable program could extend that usefulness much further. Similar thoughts would also be valid in teaching machine code programming, except for the fact that I do not know of a single assembler which even its most devoted supporters could call self-teaching.

I have outlined a number of possibilities. You will be interested to know how many of the ideas will bear fruit. So far as I am concerned, all of them may. Naturally, much depends on the views of the Editor and that, in its turn, is governed largely by your reactions and responses. So keep the ideas and suggestions flowing.

Each cartridge published in Microdrive Exchange in this series will have a file called: READ_ME and I think it is fairly obvious what it means. Each READ_ME file will have been prepared using Quill and the reader is advised to load Quill, load the READ_ME file and print it out; or at least read it on the screen before attempting to run the program(s). This file will explain the aims of the program(s) and give all the necessary running instructions.

Demonstration

Apart from the programs which will, month by month, be offered to readers through Microdrive Exchange, there will also be the series of articles. The articles will not contain listings, except perhaps short ones for demonstration purposes; they will be used to explain the ideas behind the programs, as well as to offer suggestions and ideas for those projects which, for some reason or another, will not be available on cartridges. Starting next month, I shall begin to examine each of the points raised in this issue. In the meantime, I hope that you will enjoy this month's program supplement on teaching the solution of simple linear equations.



SOFTWARE FILE

Complex Data Systems
£14.95 Master-Warship 128K
£19.95 Grandmaster-Warship 128K + 512K

Warship is the fourth title in Complex Data Systems *Master of the Universe* series, a collection of games which, according to the manufacturer's advertising, takes the player from the "dawn of man to the ultimate destination in time and space."

Since I have seen none of the other games in the series I cannot comment on whether *Warship* is representative of either their style or quality. Suffice it to say that, as an introduction, it paints a poor picture.

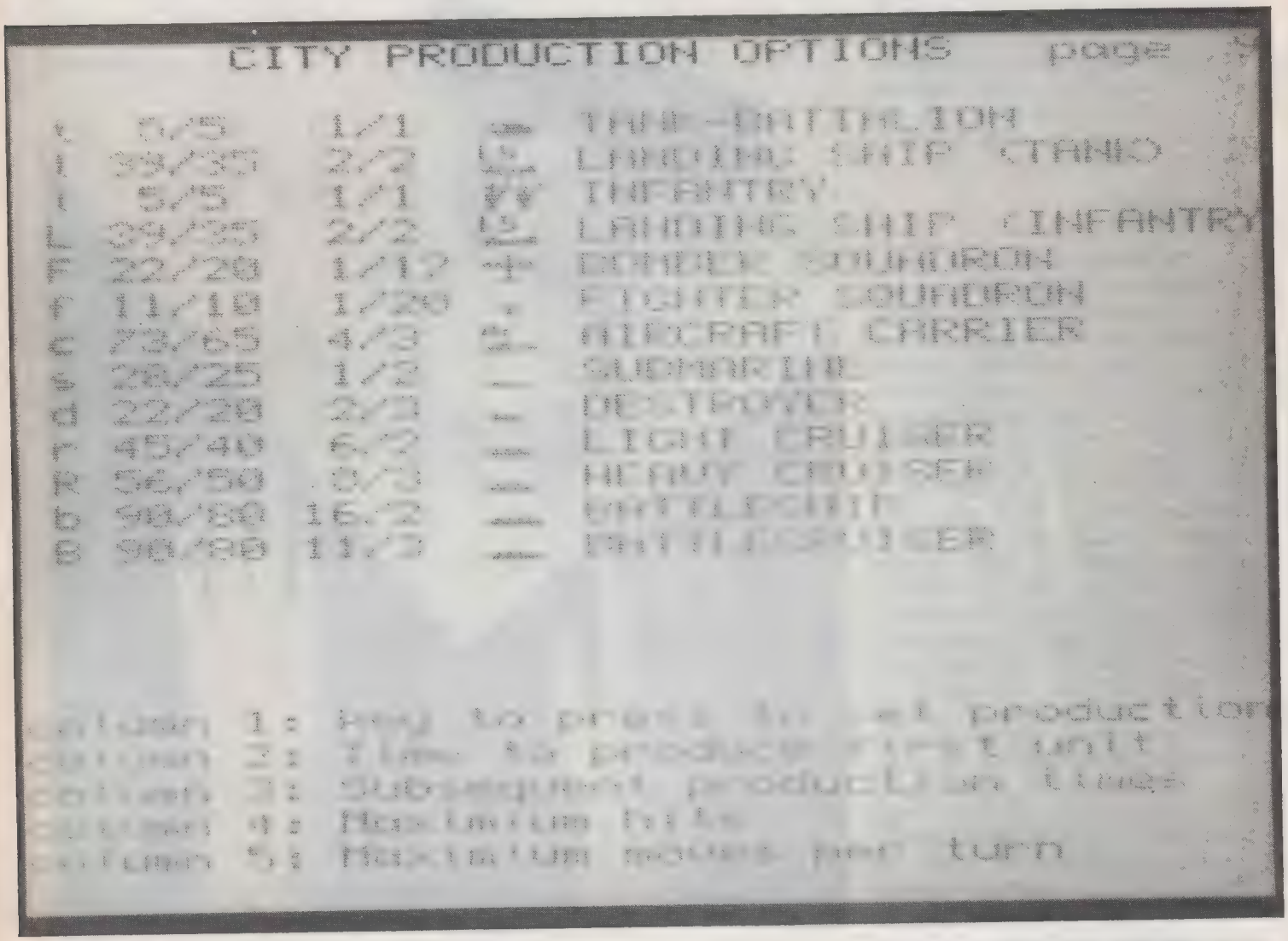
From the packaging to the contents, Warship is a series of mistakes. The first thing you notice is the incorrect loading instructions on the cassette inlay card; then there are the mis-spellings and poor syntax of the tape-based manual. Admittedly they make little difference to the game. What they display, though, is a level of sloppiness inexcusable in a commercial product.

Warship is supplied on two cartridges. Both must be in a drive during play because, rather than provide a booklet of instructions, the Warship writers have stored all the information needed to play the game on cartridge. If the one containing the instructions is located in Microdrive 2 it can be accessed at any time, even while a game is in progress, by selecting the in-built help option.

This form of presentation is pleasant though it introduces the possibility of the instructions being lost through a malfunction. I would advise anyone buying Warship to back-up the instruction tape or, better still, write the most pertinent information on paper.

Warship can be played between one player and the computer or two players using individual QLs, linked via the serial ports of the micros. Despite its title, Warship is about sea, land and air warfare. Using the forces at their disposal, players must capture a number of cities and ultimately destroy their opponent's pieces.

Cities are strategically-important sites, as they are able to manufacture craft of any kind. The time it takes to build a piece depends on its



type — whether it is a battleship, submarine, battle-cruiser or whatever. Some cities have ports which provide places for ships to load and unload and to be repaired.

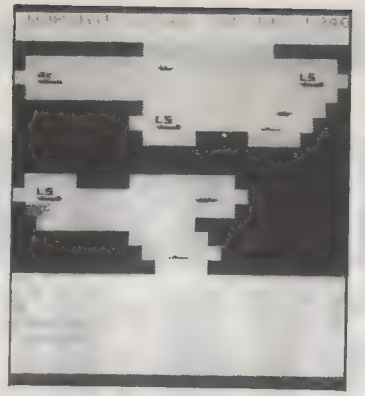
Cities are taken by deploying infantry and tank battalions nearby and moving them on the site in question. When the game starts, all cities are neutral and can be taken with ease. Once occupied, they must be defended. The playing area is a large, crudely-drawn map; the various types of craft are displayed as small icons which can be moved in almost any direction using the keys WEADSZX. How many spaces a piece can be moved during a turn depends on what type of craft it is. Two other keys, '-' and '+', are used to make submarines dive and surface.

White cursor

Before a piece can be moved it must be highlighted using a white cursor, controlled by pressing the 's' key. When a ship, aircraft or tank battalion is selected in this way, a window below the map displays information about the piece. The information for a ship, for instance, would contain data such as its speed, heading, co-ordinates and number of times hit. It is imperative that players keep an eye on this window, since it is all they have to tell them when a piece needs repairing.

On the whole, Warship is an exciting game devoid of real action or drama. Whether that is true of the entire Master of the Universe Series I do not know. I hope not, for the sake of people who have already bought any of the previous titles. It is interesting that the next program in the series is called *SDI* and is based on thermonuclear war. That there are five more games after it is strange, since there can scarcely be a future after the bomb.

Megalominia is the first word to spring to mind when



talking about *Domination*. It is a game based on the struggle to control a world by employing military and economic strategem to win territory from neighbouring countries, the idea being to bring all the land outlying a country's border under the same flag, he who ascends to the role of dictator first being the player declared overall winner.

Domination can be played by up to four potential autocrats. Any fewer and the vacant positions may be handed over to the computer which, it must be said, does not play a very strong game.

Constant area

Although the area of the world in which play takes place remains constant from game to game, the number of countries in it is entirely dependent on how many contestants, both human and computer, there are. In a four-player game each country takes a quarter of the total area. Any fewer and the territories owned by some countries become scattered.

Supposing there are four players, each owns a square spread of land, coloured different from the other three. The hue distinguishes not only a country's territory from that of its enemy but also represents an item of produce — blue, wheat; red, houses; pink, vehicles; and green, commodities. On top of one of those items every country manufactures its own weapons.

Every country is populated by an equal number of people at the start of play and they are dispersed evenly throughout three sectors comprising industry, the army and flood defences. During a game, people may be moved between sectors. How many are allocated to each usually will depend on a country's current economic state and whether it is ready to act the antagonist.

Conscription

A player making ready to attack a foreign power would probably move some people out of industry and into the army. If a country has a small population it will generally cause the amount of goods manufactured in a turn or season to fall, sometimes dramatically, so that although a country may have a strong military force in terms of manpower, it could be left with a seriously-diminished arsenal because of a fall in the production of weapons.

Being a good leader therefore means keeping all three sectors as effective as possible and not strengthening one by weakening either or both of the other two. All this is academic if people are not happy. To be happy they must be fed, housed and given the opportunity to own a few small luxuries or commodoties, as they are called.

Since one country can produce only one item besides weapons, it must import the others from foreign nations, even during hostilities. Once purchased, the buyer can raise or lower the price of the item, or any other, by a maximum of £10 a turn.

Raise prices

When the population falls, either through war or a series of random natural disasters, it is usually necessary to raise prices to maintain the level of tax collected per turn to finance an army. It is important to maintain good stocks of all the available items, because each produces a beneficial increase of some form. Wheat causes a nation's population to increase; houses its welfare; vehicles the efficiency of its transport system; commodities a leader's popularity; and weapons an army's fire-power.

Domination is played in rounds, where players take turns in issuing various commands. When it is his turn a player can buy goods, reprice goods, fight, and move members of the population between sectors.

I have left it to the end to mention fighting, because it is the most important action a player can perform. That is because a portion of a country's territory can be taken and occupied only by force. There is no peaceful way and, since the aim of the game is to rule the world, it is the only real way of winning.

Fighting takes place between small, isolated areas of two neighbouring countries. When one attacks the other the victor is not necessarily always the player with the larger army and more extensive military arsenal, though they obviously contribute. Other factors such as a leader's popularity also make a difference.

Colour change

When a player attacks another player's territory and wins the skirmish, the colour of the vanquished area changes to that of the victor. At the end of a turn the computer lists the results of the player's actions. Included are the units of each commodity produced, the amount of tax collected and the total expenditure for the season. All the information is then used to update the country's current condition.

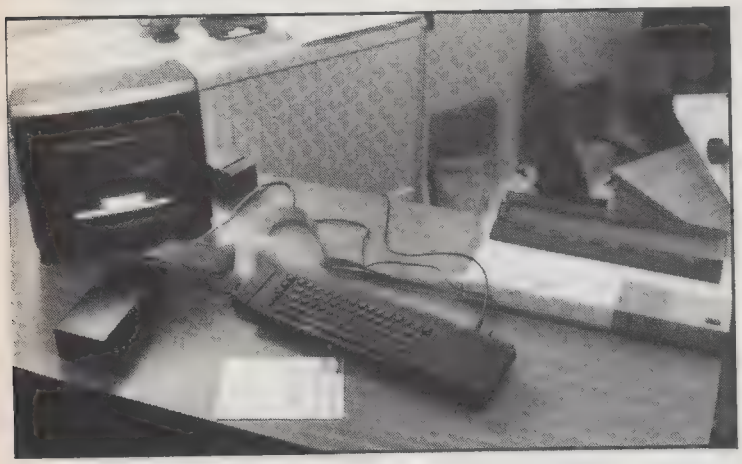
Domination is an interesting, albeit quirky, game. Its concept is hackneyed but there is sufficient drama to counteract the sense of *deja vu* its close similarity to others of its genre might cause. People who like their games to have an intellectual bias but not so great that they are defeated at every turn will find Domination a pleasant way to pass a wet Sunday afternoon.

Product:
QL Turbo+Quill
Price: *£12.50*
Source:
Athene Consultants,
33 Holly Grove,
Fareham Hampshire
PO16 7UP.
Tel: *0329 282083.*

UTILITY FILE

One of the criticisms levelled most frequently at Quill is its slow screen handling, particularly when dealing with character, word or block deleting, and word or block copying. An earlier Athene Consultants product, *Turbo Quill*, was featured in Utility File some time ago and made noticeable improvements to the overall speed of Quill.

Turbo+Quill, a related but completely new Athene product, is supplied as a group of five separate routines. The main program is used to modify your back-up copy of Quill, at the same time adding new code used to provide additional



features and include a cursor capslock indicator.

The re-configuration program allows you to tailor default drives to suit your particular QL, peripherals and working preferences. Provision is made to have drive call for help, default files, printer_dat, and the Glossary files.

If RAM discs are available, transfer of all _KeyDef files generated in Turbo+Quill "learning" mode can be made automatically, if the system call is set for RAM disc.

Pressing ‹F5› opens a menu in the centre portion of the Quill command window. You are prompted to press ‹SPACE›, to switch on the system learning mode and select which key, used with ‹CTRL›, you wish to define. If the prompt indicates "ON", pressing ‹ESC› will close the menu and Quill is now in "learning" mode.

The sequence of each keypress is saved as a file when ‹F5› is pressed again, also switching off the learning mode. ‹CTRL›&‹S› is called by the system automatically when Quill is first started and can be used to set any defaults required.

For purposes of this review, I used the start-up file to generate ‹F2› sequentially — to switch off the command menu — set the Quill left, indent and right margins, set the line-cout to 68, the upper margin to "0" and changed the footer from "page nnn" to "-nnn-".

Every time Quill is run, it starts with its usual screen, calls the ‹CTRL›&‹S› file from RAM1_and enters the various commands, getting Quill ready for use in about eight seconds without further involvement with the keyboard.

Other key combinations can be used to generate command sequences, blocks of text or combined files. I used another key combination, ‹CTRL›&‹A›, to generate a letter-heading and included changes in typeface.

Since Turbo+Quill is Quill-specific, if it is run with a multi-tasker, such as Taskmaster, it will not affect any other program. Putting Turbo+Quill against an unmodified version of the same program produced the following results:
Test Parameters: Quill v2.3; Modified v2.3 Quill; Disk drives; 640K RAM. File: 66564 bytes; 10626 words; 31 pages; 1695 lines.

As the test figures bear witness, there is an overall improvement for most of the commonly-used Quill functions, with a pronounced improvement in areas concerned with screen control. For some inexplicable reason, there is a small improvement in general file-handling, with the largest improvement in loading Quill.

An important point to remember is that Turbo+Quill is Quill version-dependent; when ordering from Athene, be sure to state which version of Quill you are using. Also, to get the most from the Glossary, careful planning must be made to ensure that using the Glssary will not cause you to lose your current document.

If you are using *Spellbound*, ‹CTRL›&‹O› should always be reserved for exclusive use by the spelling checker. For as long as it is activated, other Spellbound control keys are trapped for its own use. Access to the Spellbound keys is returned when Spellbound is switched off.

Operation	Quill	Turbo + Quill
File-handling		
Load Quill	*9.97 sec*	*5.91 sec*
Import document file	*699.61 sec*	*632.59 sec*
Save as a _doc file	*75.53 sec*	*72.21 sec*
Directory (57 entries)	*4.12 sec*	*3.09 sec*
Screen Manipulation		
Scroll top to bottom, by line	*561.12 sec*	*439.91 sec*
GO TO: Top to bottom	*13.59 sec*	*10.87 sec*
Bottom to top	*1.07 sec*	*0.97 sec*
Page 20 to 30	*8.41 sec*	*7.56 sec*
Page 30 to 20	*8.96 sec*	*8.53 sec*
Text manipulation:		
Block Delete — Scroll 108 lines	*117.41 sec*	*83.24 sec*
Re-enter insert mode	*24.28 sec*	*23.91 sec*
Block Copy — scroll 108 lines	*126.18 sec*	*83.24 sec*
Enter "K" for KEEP	*6.29 sec*	*6.01 sec*
Re-enter insert mode	*23.51 sec*	*21.83 sec*

Program: *QLOAD*
Price: *£9.95*
Source: *Liberation Software, 43 Clifton Road, Kingston-upon-Thames KT2 6PJ.*
Tel: 01-546 7795.

A new release from Liberation Software includes two utilities to make life considerably easier for SuperBasic users. The first is a SuperBasic file convertor for producing fast-load programs and adds three new extensions to SuperBasic — QLOAD, QLRUN and QSAVE.

Although fast-load conversion programs have been available for the QL for some time, some of the earlier versions of this type of routine had the severe restriction that either they would work only with Microdrives, they were machine configuration-dependent — in terms of memory expansion an other add-ons — or both.

Even more restricting, fast-load programs had the unfortunate effect of hanging the QL, if a tokenised file was made when toolkits or other extensions were in residence when the save file was made, and were not present when the program was re-loaded.

Fast load

The Liberation *QLOAD* utility has removed those restrictions and has reduced loading time to a very impressive level. Typical loading times for a 30K program, normally four to seven minutes from a SuperBasic file, has been reduced to about 30 seconds. The length of a program bears little relation to its loading time.

To understand the principles of how QLOAD works, you must appreciate that a SuperBasic program is a text file and is saved and loaded character by character. As such, it can be copied directly to printer or screen and will be reproduced in the same form as it appears as a screen listing.

When being loaded, the interpreter has to process a program to restructure memory associated with a program and to tokenise it in a form usable internally by the QL. It is for this reason that loading Basic produces intermitment drive access.

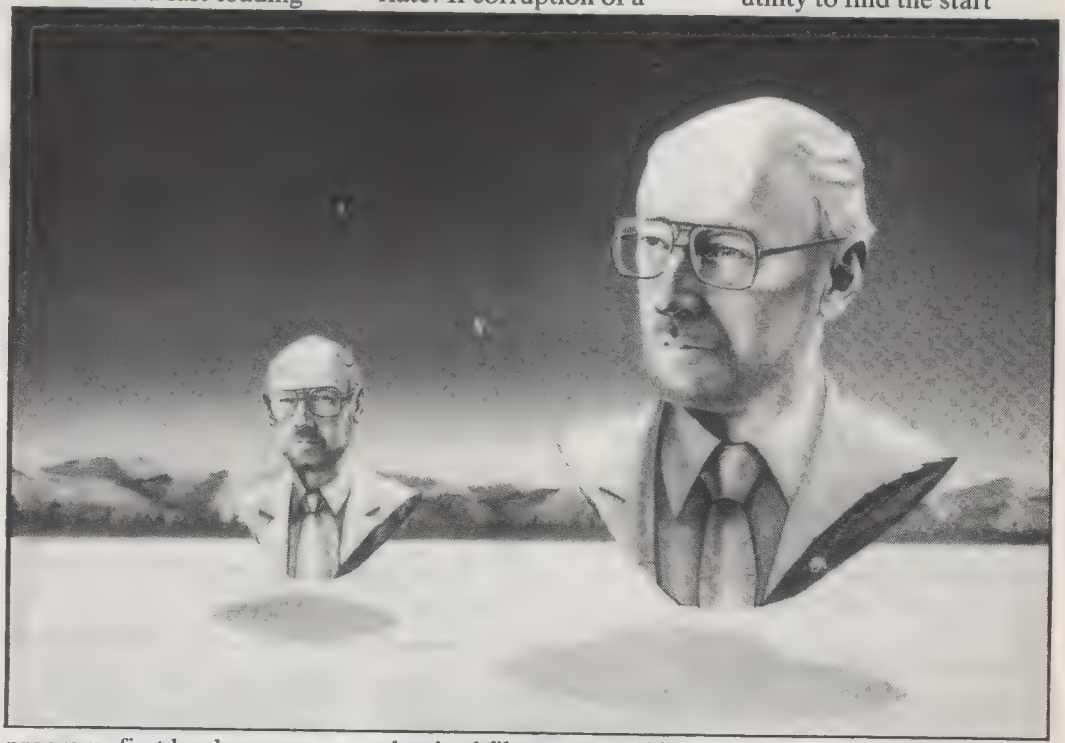
To make a fast-loading program, first load QLOAD, followed by the SuperBasic program you wish to convert, using the normal LOAD command. The program is then saved by entering the command:

(QSAVE drive_filename)

The file will be saved as a snapshot-type file, in a tokenised form used internally by the QL. Subsequent copying to screen or printer will fail to produce a text listing and will appear similar to a compiled or machine code program.

To re-load a file converted by QLOAD, load QLOAD, input either *QLOAD* or *QLRUN drive_filename.* When loading is completed, the program can be listed and modified in the same way as any other SuperBasic program. If a program is modified, the old file must be deleted and a new one created with the QSAVE command. If a program is saved when extensions have been loaded and are missing on subsequent re-loading, the missing names are listed in window#0.

A word of warning — since QLOAD files cannot be modified it is a good idea to keep a copy of the standard listing and use the tokenised file to work with, updating each as appropriate. If corruption of a tokenised file occurs and it is the only copy of the program available, there is no way it can be recovered.



The second Liberation program, *QREF*, is a powerful cross-referencing utility. The QREF procedure prints details of a given name from the interpreter name table, followed by a cross-reference of every line number in which a reference to the name appears.

Type Details

Inputting the name of a variable will print details of its type — string, float or integer; if it is a FOR or REPeat index that is also shown. Search parameters may be specified with a given name. QREF_V produces a cross-reference to all used variables; QREF_P produces cross-references of all procedures and functions in the current program; QREF_M details machine code routines used in the current program; QREF_A lists all name table types. Hard copy of all of the QREF variants can be made by the typical commands: *OPEN#3,ser1 : QREF_A#3.*

Full wildcard facilities are available and will produce a list of names from matches found from their leading characters. Machine code programmers can use this utility to find the start addresses of their extensions.

QFIND, closely related to QREF, is a facility for simplifying editing of a given name in a program. Inputting EDIT QFIND will enter you at the first line of the program; EDIT QFIND ("proggy_name") will put you into the line for the first occurrence of the name. If a name refers to a machine code routine, QREF will return the routine's start address in decimal.

Supplied in two forms, QLOAD and QREF may be run independently or, if you are working on a program, from their combined routine. Of particular interest to commercial software houses wishing to sell Basic programs which can be tailored by the end-user, Liberation has a special run-time version of QLOAD available which does not include the QSAVE feature.

Users should bear in

UTILITY FILE

mind that tokenised programs take more media space than their SuperBasic equivalents and should ensure that sufficient space is available on the destination drive.

On average, a tokenised SuperBasic program will grow by between 30 and 50 percent in file length. It should be pointed out, however, that the file size increase does not mean that there is a proportionate increase in memory requirement as well.

Using QLOAD is extremely easy and uncomplicated. An invaluable utility, at its current price it is most certainly not a product to be missed by users wishing to save wear-and-tear on their drives.

Product: *Supertrace*

Price: *£5*

Source: *Stack Software, Great Wolford, Shipston-on-Stour, Warks CV36 5NQ.*

Tel: *060874 369.*

However tentatively, very few QL owners can resist the temptation to program. If for no other reason, SuperBasic is one of the best Basic implementations available and is relatively easy to use. To whatever depth one's interest eventually takes them, there is always a tool available which will make the job a little simpler; some tools are indispensible.

As programs become increasingly complex, interaction of routines can sometimes produce spurious responses in an illusive manner. Many hours can be spent debugging a program, only to have one's efforts end up by seeming that the bug is of a roving nature.

Supertrace must be the most reasonably-priced programming tool released. A dynamic tracing facility, Supertrace allows you to halt the operation of a program by linking TRACE with the QL interrupts.

Once loaded, ‹CTRL›&‹A›, ‹T› and ‹U› are always active. Respectively, those keys arrest Basic — and allow single-stepping through each command — trace a Basic program while it is running and halt the trace function. While a trace is being executed, three additional keys, ‹CTRL›&‹S›, ‹D› and ‹I› toggle a trace stop/start, decrease the spped of a trace by one of five increments and increase the trace speed, with a time-out range of 1-200, also respectively.

Users are advised to turn off TRACE (‹CTRL›&‹D›) before loading a SuperBasic program. While the transfer from the source media is not affected by the trace facility, if on, tokenisation is.

TRACE can be entered either as a direct command or in the program being examined. UNTRACE, used in the same manner, switches off the TRACE. If used as a direct command, you should load your program and type:

TRACE : RUN or, alternatively, *CLEAR : TRACE : RUN*

When using Supertrace, there is one point of caution which should be observed — DEFine PROCedure/FUNction and LOCal and the lines following them are missed unless a *PAUSE 0* is added to the relevant line.

Update

The current releases of both ordinary and special editions of the Digital Precision *The Editor* have been updated to include some amended commands and DP has included its new printer driver:

* Command files may now contain non-executable remarks by prefacing them with a full-stop. This rather useful facility now allows you to title each command file and include information relative to its function, without being limited to a meaningful filename.
* Cursor movement, whether by line or character, no longer produces overshoot.
* Find and Exchange strings may now be qualified to execute a command with given characters at either the beginning of a line, the end of a line, or both.

The new DP printer driver can be used as a stand-alone task. The Turbo extensions, supplied with Editor, must be loaded before using Driver. If run alongside Editor, only one set of the extensions is required.

Driver works directly from saved text files and is supplied with both internal default values and a file with the familiar name of printer_dat. As pointed out in the DP documentation, there is no restriction on the name of the data file used by Driver and any number of such files may be created for particular applications.

Options are available for including a wide range of printer codes, page formatting — page numbers, footer line(s), header line(s), page lengths, margins and page numbering. In common with the facility provided by Quill, the data file includes baud rate, any pre- and post-amble codes and the code your printer requires at the end of a line CR, LF or both.

Detailed, step-by-step instructions are supplied with Driver and provide a very flexible system for complete printer control.

The popularity of Qats version 3.00 is gathering momentum. A number of new features have been added to this powerful front-end system. A configuration system has been added so that you now have the choice of setting system defaults either permanently or temporarily. Jobs can be specified as foreground or background and Qats now supports LRUN for a Basic program.

Directory presentation follows the same convention used since the first Qats release. Qdos allocates sectors on Microdrive and RAM disc but in blocks of three for floppy. The sizes of directory entries are indicated in whole units of sectors used by the relevant media.

Although menus remain optionally mobile, windows default to their fixed positions and must be unlocked by entering a "+", enabling movement, or a "–" to disable movement. Entering a "" toggles the locking.

The Qats powerful Output Control has been enhanced in a number of areas. The Stationery Codes table has been re-arranged and renamed; the Setups table now includes a line-spacing code; the Translates table has been altered to support hundreds of strings. The Output Control module has been split into three separately-connectable services.

●A number of readers have written to query references I made in Utility File reviews for several PDQL products and their requirement for the availability of the Turbo Toolkit. The products, *PDQ-XREF, Sedit* and *Compare* are compiled with Turbo and require the run-time version of Turbo Toolkit. I would like to make it clear that these and all other PDQL programs are sold as complete stand-alone products — as are all other compiled programs of which I am aware — and require no separate purchases to get them up and running.

Apologies to PDQL and all concerned for any confusion which may have been caused.

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As time passes the range of software available for the QL moves on and up in leaps and bounds. The advent of compilers and other utilities such as *Taskmaster* has the infamous black box at last realising the potential which was so obviously there with its inherent multi-tasking abilitieis but until the last year and a half sadly unexploited. On the plus side, QL users have been fortunate that the majority of software released for the well-loved machine has usually been of a very high standard.

On this note I am pleased to report that *APT* — Adventure Programming Tool, the latest offering from Shadow Games — lives up to the quality we have learned to expect from QL software in recent times.

APT consists of seven programs and several data files spread over five Microdrives or on one disc, depending on your set-up. You can buy the system in stages with the Adventure Writer module costing £34.95, the Graphics Designer module at £29.95 and the Linker Kit module to combine the two at £14.95. If purchased as a complete system, the Linker Kit is included for no extra charge.

Flexibility

The APT system has been designed with flexibility; its aim is to give the potential adventure writer the chance to incorporate new ideas. Any number of messages, flags, special conditions or other features may be included in your games. The information which defines a game is set up in the various data files provided and can be added to or changed with the appropriate multi-tasking utilities provided.

The release version of APT will have a front-end for all the utilities — called the "CAPTAIN" — so that access to the various parts of the program can be achieved by a few simple keystrokes. It was not available at the time of writing.

Text in the game can be displayed with the full range of standard INK and STRIP colours, enabling the highlighting of important words and messages. There are several modes available for the screen display; either a full screen of text can be utilised or if you have illustrated your game the dual mode can be used. That splits the screen into two windows, one for the graphics — you will have already determined the size of this window from within the Graphic designer program — and the bottom half to the text.

The interesting point is that both MODE 8 and MODE 4 can be displayed on the screen at the same time, giving you eight colour capabilities for your graphics window and four colours for your text window. It is worth mentioning that although graphics enhance the appeal of an adventure considerably you pay for it in time, as in the dual mode after an input you have to wait for a new picture or the same one to be re-drawn before you can continue. The larger the Graphics window is the slower the process of re-drawing; for that reason it is recommended that you use no more than half the screen for pictures.

The APT graphics module, the Graphics Designer, includes two screen compression techniques which will enable you to store complex screens in as little as 600 bytes. Available with the APT system is a screen compression utility which can reduce pictures drawn with rival graphics packages by a factor of two, plus making them compatible for the APT linking system.

The limit of any adventure written using APT is constrained mainly by the amount of extra RAM you have or do not have on-board. If memory is not a limitation, the fixed limits are:

* A vocabulary of 4,096 words, each up to 20 characters in length.
* 98,304 messages.
* 255 locations.
* 256 objects in a game.
* Real-time event timing.
* Each object or location can have up to 127 parameters, each of which can be used either as a single 8-bit number with values 0 to 255, or as eight separate flags numbered 0 to 7.

Preference

It is also possible to increase the range of a game by writing it in parts. Entry into each successive part can be made by utilising a password from the preceding section to move into the next level on each successful completion.

Text in APT is divided into three groups; location, used to describe each location in the game; object, used to

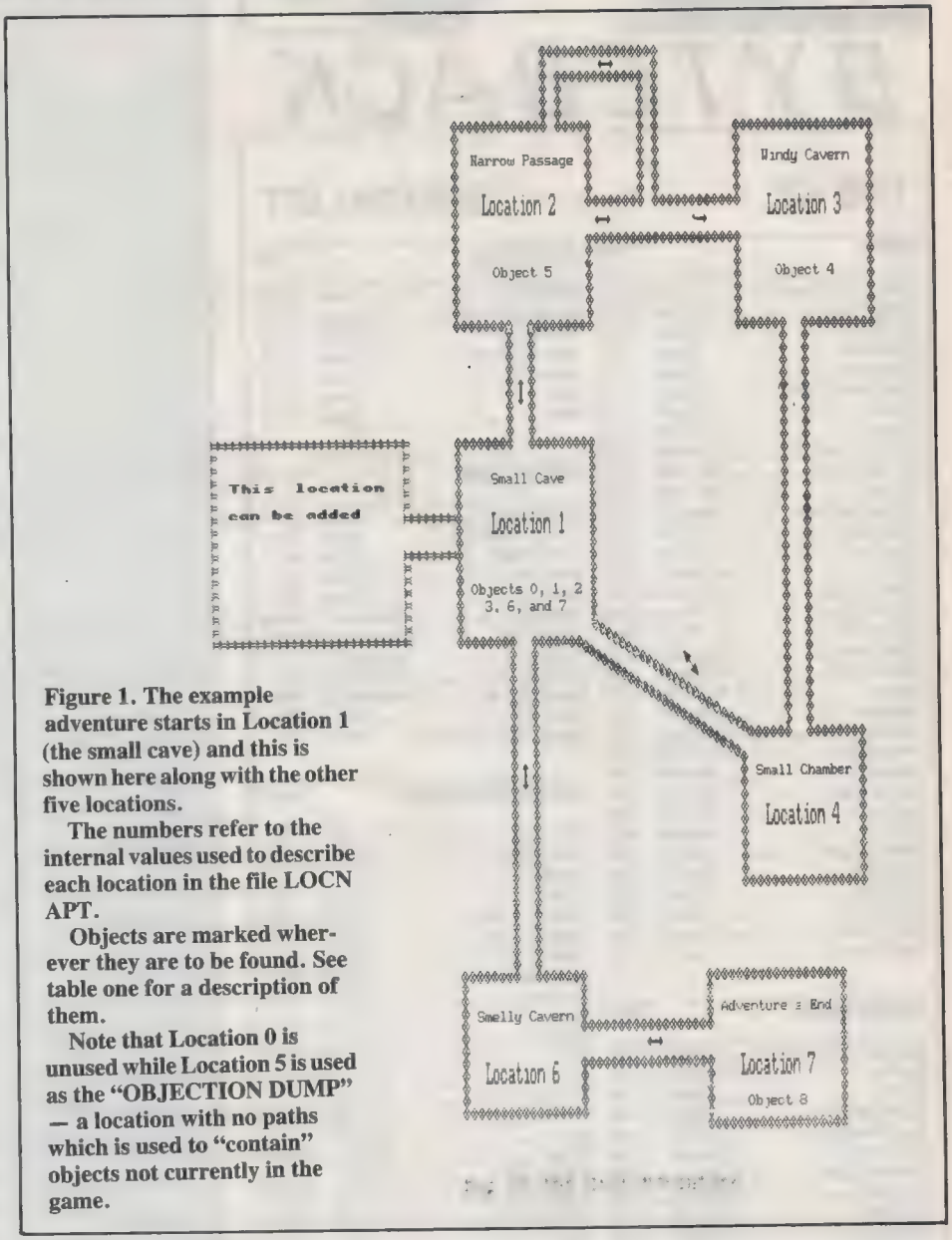

Figure 1. The example adventure starts in Location 1 (the small cave) and this is shown here along with the other five locations.

The numbers refer to the internal values used to describe each location in the file LOCN APT.

Objects are marked wherever they are to be found. See table one for a description of them.

Note that Location 0 is unused while Location 5 is used as the "OBJECTION DUMP" — a location with no paths which is used to "contain" objects not currently in the game.

Make your escapades come alive

We look closely at the APT Adventure Programming Tool from Shadow Games

Number	Description	Location	Contained in
0	Electric torch	1	2
1	Tool box	1	—
2	Broken torch	1	—
3	Gas lighter	1	—
4	Oil	3	—
5	Sponge	2	—
6	Waste bin	1	—
7	Note	1	6
8	Note	7	—

•Table 1: The objects in the mini-adventure.

describe objects and any messages written on them, or other required text information; general message data is used for any other messages.

Each group of messages is given numbers, starting at 0 to a maximum of 32,767. A message can be any length up to a limit of 1,600 characters.

Complexity

APT is provided with its own adventure game and appropriate files to use as your tutorial and starting-block. There are two versions, one called MINI-ADVENTURE — which is text only — and the other MINI-PIC, which contains graphics as well as the text. The game is fairly good and if you refer to figure one you will get some idea of the complexity. Table one is a rundown of the objects in the game. It is not a mega-adventure but its value lies in being a foundation from which you can work.

You have a new Basic language with APT which is similar to SuperBasic but also to an assembly-level language. It controls the operation of the two programs which make up an adventure, called the PLAYER and the EVENT. The PLAYER program takes the commands input by the user during an adventure and accordingly makes sense and takes the appropriate actions.

The EVENT program controls activities such as movement and actions of creatures and keeps control of any time-dependent functions such as burning objects. The two programs will not run independently as SuperBasic programs but can be loaded and edited in SuperBasic or alternatively with an Editor.

After you have made any changes you compile them on to a new cartridge using the utility APTASM_TASK provided and then link the various location and object files you have formulated to make up a new adventure. APT Basic, as well as using various SuperBasic keywords, gives you a range of around 50 new keyword functions and procedures. They are well-documented in the manual but will require some study — using PLAYER or EVENT — to see how to implement them into your own features.

The clearest way of understanding the processes involved in the construction of an adventure game is by referring to the development tree given in table one. From it you can see that at each stage you will be using one of the relevent TASK utilities provided to link and compress each program and file of the adventure.

On calling-up a TASK you are presented with an editing screen into which you can load the appropriate file or program ready for changes, linking or compilation. The editing screens are simple to use and will present no problems in use. One word of warning; the manual states clearly that you should make back-up copies of all the programs and files before you start using them. If you are editing a file already set up the old file is deleted to make way for the latest version when you are ready to save. So if you have difficulty at this part, or there is a system crash, you may find yourself without the relevant file.

Once you have made changes in the two fundamental programs PLAYER and EVENT you run it through the APT program compiler APTASM_TASK which combines them into a single file called PROG_APT.

Geographical

As you can see from table one, APTMSG_TASK edits the three text message files for locations, objects and general message.s Each has the suffice _MSG. Once the three source text files are ready you plough them through APTCOM_TASK, a text compression utility which combines the three files into one file called TEXT_COM.

You can fix geographical directions for locations and objects by using the APTLOC_TASK to edit the two data files LOCN_APT and OBJT_APT provided. Alternatively, you can create your own. The two files set up compass point directions for your objects and locations, ie., north, south, up, down and so on.

Your vocabulary is contained in the word data file WORLD_APT and is accessed by APTWRD_TASK. With it you can add to or alter the existing 150 words provided in this file. Each word has a number and a search facility is provided for quick access and to see whether the word already exists. Your outer limits are 4,096 words. Words can also be characterised as verbs and nouns. You can, or course, start a completely new word file.

You can, of course, start a completely new word file.

APTDTA_TASK edits various pieces of information required by the linker program from the file LAST_APT. It is also used to add your own machine code routines. The last link in the chain is the APTLNK_TASK utility which, when run, will combine automatically the seven files which make up a completed APT adventure. You are prompted for each file name in turn and, once they have all been read, an output file can be generated on to a new medium with your chosen file name.

The graphics package has been designed as a stand-alone drawing program with which you can produce your pictures as a standard 32K screen dump for use in other programs. You can also save your drawing as a SuperBasic file for merging into a program. Pictures can also be saved for compiling into a group drawing file for the APT adventure writer.

Preference

On loading you are able to adjust the size of your drawing screen to suit your preference. The program uses ‹F1› to select the Help menu which displays the keyword options, which are then accessed by pressing the first letter. At most stages of operation you can press ‹ESC› to exit without implementing changes.

At the top of the screen a series of status windows show the state of play of INK and PAPER colours, X and Y co-ordinates for the drawing cursor, the SCALE you are in, and whether you are in NORMAL, HIGHLIGHT or COMPLEMENT colour representation.

The SCREEN CONTROL commands are ‹M›ode which toggles between MODE 4 & 8; ‹J›ump takes the cursor back to the screen centre; ‹Z›oom can magnify from wherever the cursor is positioned on a scale of 1-8; ‹W›ipe can clean the screen or clean and re-draw the screen using complementary colours; ‹U›ndo successively deletes previous drawing actions; ‹R›eset puts the picture back to SCALE 1 and cursor to starting position — useful after detailed work using ZOOM; ‹N›ew abandons the current drawing and puts the defaults back to start-up parameters.

The COLOUR CONTROLS are all catered for with easy-to-use menus on ‹P›aper, ‹I›nk, ‹F›ill, and ‹O›ver options. DRAWING OPTIONS are rubber-banded with the standard shapes catered for ‹C›ircle, ‹E›llipse, ‹B›ox, ‹A›rc, ‹T›riangle. ‹Y›OUTLINE will put a different ink border around your drawn shape.

During all drawing operations you can press ‹F1› for a menu box to show if you can enlarge, rotate, decrease, fix, escape from the shape in use. Pressing ‹F2› will give you the dimensions of the current shape or line. The drawing cursor is moved by the cursor keys which, if held down, increase the speed of movement dramatically. I found it difficult to use the cursor action smoothly, usually over-running the intended destination. You should be able to use a joystick with better results, though unfortunately mouse operation is not yet possible in this program.

TEXT can be input anywhere on the screen in all CSIZES and colours, with a maximum of 25 characters in one message. There are several DRAWING AIDS available such as ‹Q›uery, which lets you step back through a drawing to obtain x,y co-ordinates shapes and option used at each stage. With ‹G›rid you can set and remove a line or dot grid set to your own pixel dimensions. There is also a ‹H›old command for time delay input for drawing. Graphic Designer also provides a number of file-handling commands for viewing, saving and loading.

The APT system provides you with an excellent tool for crafting your own mega-adventures. The flexible architecture of the program allows your designs to be as complicated or as simple as you wish. The many parts of the system will, of course, take a good deal of time and effort to utilise to maximum benefit.

Success

Writing an adventure game is no easy task and has to be well-thought-out to have any chance of success. Although not so complete as rival programs, the Graphics Designer is competent and simple to use and is a useful addition to the software available on the QL.

The ability to merge text and graphics is the *piece de resistance* of APT and those inclined towards the writing of adventures will be more than satisfied by this offering.

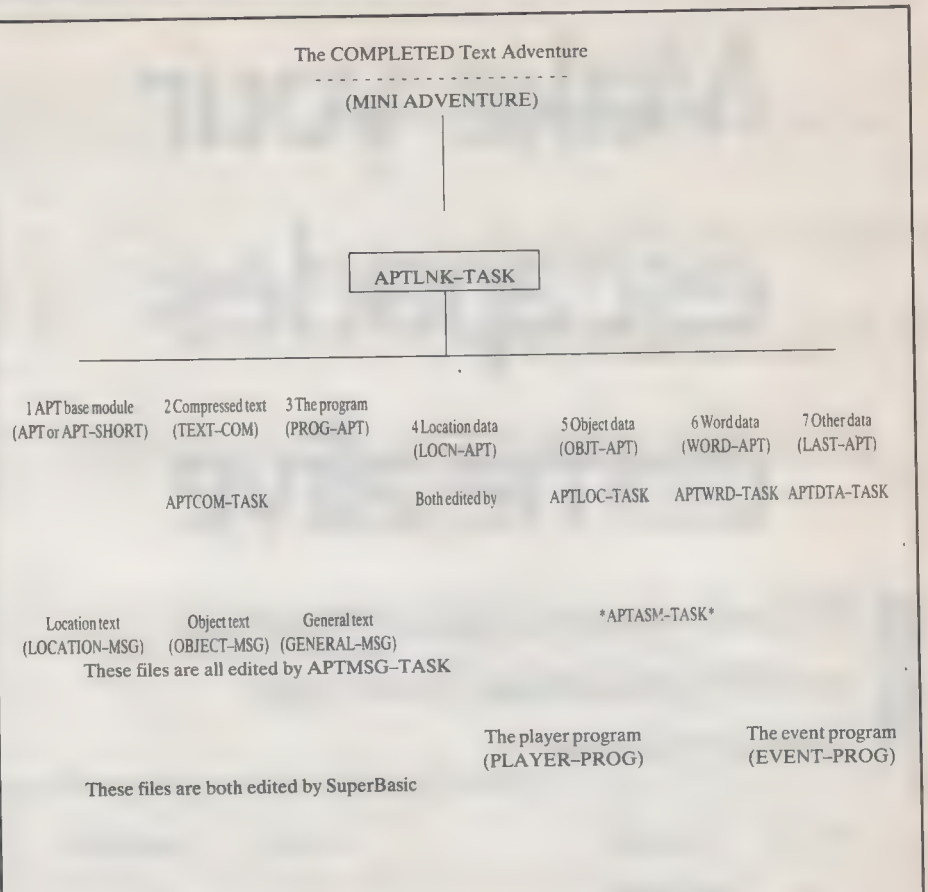

Table 2: The development tree of an APT adventure game.

File names are included in upper-case characters and the appropriate names used in the mini-adventure are in brackets.

Each box shows a particular APT utility program and the data files it edits. Where the input files are from another program, the utility name only is included in the box and the input files are shown by the previous process or box below. All the utility programs have the –TASK extension.

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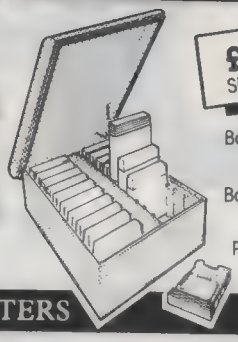

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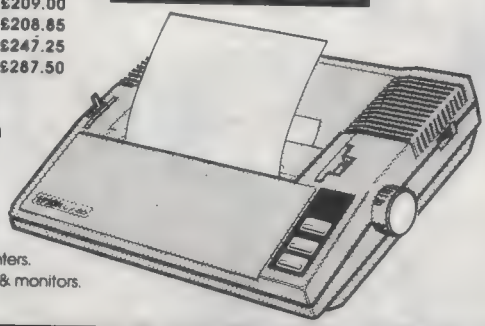

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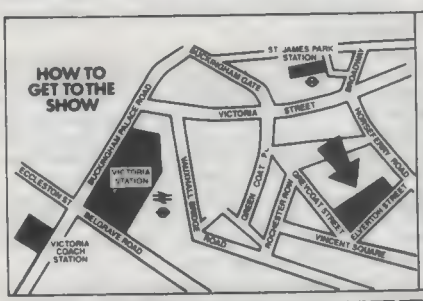

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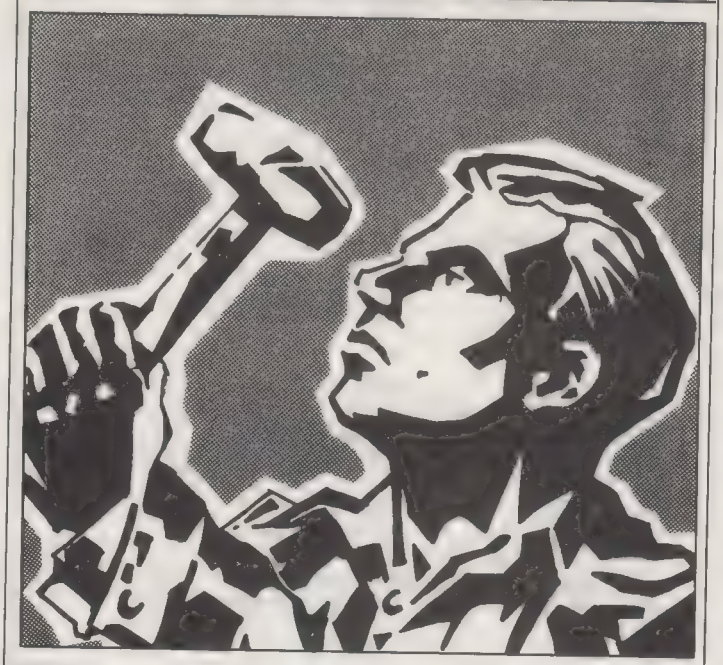


Each month Marcus Jeffery adds novel new procedures and functions to the QL repertoire. This month he develops the PEEK and POKE commands.

Having compiled a number of ideas for future DIY Toolkit articles, this column returns as a regular feature. This month we will be developing two very simple commands which are lacking on the QL. Though not used extensively, their omission became apparent to Charles Gerrard when writing the *Psycho* program — see Talking Back, June 1987.

The commands deal with poking and peeking strings to and from memory. Other micros, such as the BBC, have this facility. Though including POKE (for bytes), POKE-W (for word lengths) and POKE-L (for long words), the ability to POKE-$ (for strings) is missing. Similarly with the corresponding PEEK commands.

The machine code for this operation is simple. The only possible problem which has to be watched is that of even word boundaries. The QL stores string lengths accurately as a word length integer at the beginning of the string. When storing the string, however, the length is always rounded up to a factor of two to cover even-word boundaries.

If we look at the assembly code listing in figure one we can see that the start-up sequence — lines 1 to 17 — is exactly the same as normal, declaring one new procedure (POKE-$) and one new function (PEEK−$). The main code starts at line 21. This is the POKE-$ command which expects two parameters in the form:
POKE−$ loc,string
which will place the 'string' in memory, starting at memory location 'loc'.

Storage

When calculating the amount of memory required for string storage, sum the length of the string rounded up to the nearest even number, plus two. That will give the even string length and the word length necessary to store the length at the beginning.

Method

The BBC micro uses a slightly different method for storing strings. Instead of storing the length explicitly, it adds a carriage return character to the end of the string — i.e., CHR$(13). This procedure was used in the Psycho program by Gerrard and could have been used in this machine code routine. The BBC micro method would save a little space but the saving is very small and not really necessary with the extensive memory available on the QL. Therefore it seemed appropriate to implement the standard QL format.

The POKE-$ procedure expects two parameters, one of type 'long integer' — the memory location — and one of type 'string' — the string to be poked. Consequently the parameters have to be accessed separately. The parameter list lies between the addresses represented by registers A3 and A5. Each of these should be eight bytes long.

Returned

Consequently lines 22 to 25 check that the difference between the two values is 16, giving two parameters. If that is not the case, 'Bad Parameter' is returned, because the subsequent code will not work correctly.

The next section — lines 26 to 32 — retrieves the first parameter as a string variable by reducing the top — register A5 — by eight bytes and calling the machine vector CA.GTLIN. The registers A3 and A5 are stacked and restored at the start and end of this code. Then, by increasing the value of register A3 by eight, the second string parameter is retrieved by calling the vector CA.GTSTR.

Rounded

The first word of the string variable returned will be its length. It is stored in the location to be POKEd, then rounded up to the nearest even value. The loop starting at label STORE then saves the string as pairs of characters:
PEEK−$(loc)
where the string to be retrieved should start at memory location 'loc'. Being of a single type, the number of parameters is best checked by looking at the value of register D3 on return from the CA.GTLIN vector and branching if this is not equal to one.

When returning any value from a function, the code must reserve adequate space on the stack. That is done by calling BV.CHRIX with the number of bytes required in register D1. In this case, we must reserve the string length — rounded up to an even number — plus two bytes to save the length of the string, in normal QL format. Hence line 58 adds three to the value in register D1 when rounding up.

Once the string length is saved, the loop starting at the RESTORE label saves the entire string, byte by byte. Finally, before returning to SuperBasic, the value one is placed into register D1 to indicate that we are returning a string result.

I have had a number of enquiries from people who are having difficulty entering our DIY Toolkit routines using their own assemblers. The assembly

```
LOC       OBJECT          STMT    SOURCE STATEMENT

                            1 *
                            2 *  First add the Procedure & Function
                            3 *
0000'  3078 0110            4         MOVE.W   $110,A0          $110 = BP.INIT = Add proc/func
0004   43FA 0006            5         LEA.L    PROC,A1          Link in procedure/function
0008'  4E90                 6         JSR      (A0)
000A   4E75                 7         RTS
000C   0001                 8 PROC    DC.W     1                Number of procedures
000E   001A                 9         DC.W     POKE-*           Relative location of POKE_$
0010   06                  10         DC.B     6                Length of procedure name
0011'  504F 4B45 5F24      11         DC.B     'POKE_$'         Name of procedure
0018'  0000                12         DC.W     0                End of procedures
001A'  0001                13         DC.W     1                Number of functions
001C'  005C                14         DC.W     PEEK-*           Relative location of PEEK_$
001E'  06                  15         DC.B     6                Length of function name
001F'  5045 4548 5F24      16         DC.B     'PEEK_$'         Name of function
0026'  0000                17         DC.W     0                End of functions
                           18 *
                           19 *  This is the POKE_$ procedure
                           20 *
0028'  70F1                21 POKE    MOVEQ    #-15,D0          D0 = Bad Parameter error
002A   220D                22         MOVE.L   A5,D1            Check number of parameters
002C'  928B                23         SUB.L    A3,D1
002E'  0481 0000 0010      24         SUBI.L   #16,D1
0034'  6600 0040           25         BNE      POEXIT           Branch on error
0038'  48E7 0014           26         MOVEM.L  A3/A5,-(A7)
003C'  518D                27         SUBQ.L   #8,A5            Get first parameter
003E'  3078 0118           28         MOVE.W   $118,A0          $118 = CA.GTLIN = Long int collect
0042'  4E90                29         JSR      (A0)
0044'  6600 0030           30         BNE      POEXIT           Branch on error
0048'  2876 9800           31         MOVE.L   0(A6,A1.L),A4    A4 = Poke address
004C'  4CDF 2800           32         MOVEM.L  (A7)+,A3/A5
0050'  508B                33         ADDQ.L   #8,A3            Get second parameter
0052'  3078 0116           34         MOVE.W   $116,A0          $116 = CA.GTSTR = String collect
0056'  4E90                35         JSR      (A0)
0058'  6600 001C           36         BNE      POEXIT           Branch on error
005C'  3636 9800           37         MOVE.W   0(A6,A1.L),D3    D3 = Length of string
0060'  38C3                38         MOVE.W   D3,(A4)+         Store length
0062'  5243                39         ADDQ.W   #1,D3            Round D3 up to even length
0064'  0243 FFFE           40         ANDI.W   #$FFFE,D3
0068'  5489                41 STORE   ADDQ.L   #2,A1            Store string to memory
006A'  38F6 9800           42         MOVE.W   0(A6,A1.L),(A4)+
006E'  5543                43         SUBQ.W   #2,D3
0070'  6600 FFF6           44         BNE      STORE
0074'  4280                45         CLR.L    D0               Signal no error
0076'  4E75                46 POEXIT  RTS
                           47 *
                           48 *  This is the PEEK_$ function
                           49 *
0078'  3078 0118           50 PEEK    MOVE.W   $118,A0          $118 = CA.GTLIN = Long int collect
007C'  4E90                51         JSR      (A0)
007E'  6600 0046           52         BNE      PEEXIT           Branch on error
0082'  70F1                53         MOVEQ    #-15,D0          D0 = Bad Parameter error
0084'  B67C 0001           54         CMP.W    #1,D3            Should be a single parameter
0088'  6600 003C           55         BNE      PEEXIT           Branch on error
008C'  2876 9800           56         MOVE.L   0(A6,A1.L),A4    A4 = Peek address
0090'  3214                57         MOVE.W   (A4),D1          D1 = Length of string
0092'  5641                58         ADDQ.W   #3,D1            Add 2. Round up to even length
0094'  0281 0000 FFFE      59         ANDI.L   #$0000FFFE,D1
009A'  2801                60         MOVE.L   D1,D4
009C'  3078 011A           61         MOVE.W   $11A,A0          $11A = BV.CHRIX = Reserve stack
00A0'  4E90                62         JSR      (A0)
00A2'  226E 0058           63         MOVE.L   $58(A6),A1       Retrieve stack pointer
00A6'  93C4                64         SUBA.L   D4,A1            Make stack space
00A8'  2D49 0058           65         MOVE.L   A1,$58(A6)       Update stack
00AC'  321C                66         MOVE.W   (A4)+,D1         D1 = Length of string
00AE'  3D81 9800           67         MOVE.W   D1,0(A6,A1.L)    Stack string length
00B2'  5489                68         ADDQ.L   #2,A1
00B4'  1D9C 9800           69 RESTORE MOVE.B   (A4)+,0(A6,A1.L) Stack string
00B8'  5289                70         ADDQ.L   #1,A1
00BA'  51C9 FFF8           71         DBRA     D1,RESTORE
00BE'  226E 0058           72         MOVE.L   $58(A6),A1       Restore stack pointer offset
00C2'  7801                73         MOVEQ    #1,D4            Return 'string result'
00C4'  4280                74         CLR.L    D0               Signal no error
00C6'  4E75                75 PEEXIT  RTS
                           76
                           77         END

No errors found in this Assembly
```

•Figure One

DIY TOOLKIT

code listing given in these articles is produced from the Metacomco Assembler Development Kit. Most assemblers will give similar output, though you should check your manual for the exact format expected.

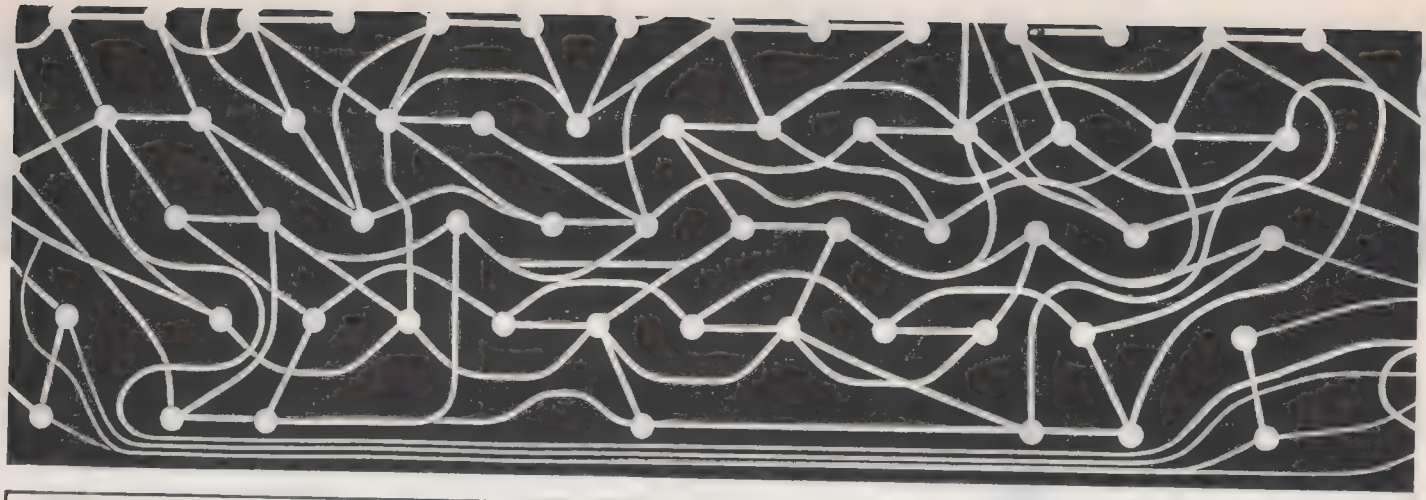
One important point to note is that the assembler has added an extra zero byte between lines 11 and 12, and lines 16 and 17. This does not show under the OBJECT hex heading but can be seen by following the numbers under the LOC heading. This has obviously been done to correct even boundaries for the word instructions following.

Visible

These extra bytes are more visible in the SuperBasic Hex Loader DATA statements, in figure two. If you do not have an assembler package, type-in the SuperBasic program to save the machine code to Microdrive or disc.

Once saved, a short demonstration program — figure three — has been included to check that the code is working correctly. This accepts a string as input from the user, POKEs the string to memory, deliberately corrupts the string, then restores it by PEEKing the previously-stored string. That is nothing very exciting but it will prove that everything is working correctly. It also shows that the new extensions will handle such cases as zero length strings and so on.

Before using the demonstration program you



```
100 REMark : Sinclair QL World
110 REMark : ** HEX  LOADER **
120 :
130 CLS
140 RESTORE
150 READ space
160 start = RESPR(space)
170 PRINT"Loading Hex..." : hex_load start
180 INPUT"Save to file...";f$
190 SBYTES f$,start,byte
200 STOP
210 :
220 :
230 DEFine PROCedure hex_load(start)
240 :
250     DEFine FuNction decimal(x)
260     RETurn CODE(h$(x))-48-7*(h$(x)>"9")
270     END DEFine decimal
280 :
290 byte = 0 : checksum = 0
300 REPeat load_hex_digits
310     READ h$
320     IF h$="*" THEN EXIT load_hex_digits
330     IF LEN(h$)<>2*INT(LEN(h$)/2) THEN
340        PRINT"Odd number of hex digits in: ";h$
350        STOP
360     END IF
370     FOR b = 1 TO LEN(h$) STEP 2
380        hb = decimal(b) : lb = decimal(b+1)
390        IF hb<0 OR hb>15 OR lb<0 OR lb>15 THEN
400           PRINT"Illegal hex digit in: ";h$
410           STOP
420        END IF
430        POKE start+byte,16*hb+lb
440        checksum = checksum + 16*hb + lb
450        byte = byte + 1
460     END FOR b
470 END REPeat load_hex_digits
480 READ check
490 IF check <> checksum THEN
500     PRINT"Checksum incorrect. Recheck data."
510     STOP
520 ELSE
530     PRINT"Checksum is correct"
540     PRINT"Data entered at: ";start
550 END IF
560 END DEFine hex_load
570 :
580 REMark : Space requirements for the machine code
590 DATA 200
600 :
610 REMark : Machine code data
620 DATA "3078011043FA0006","4E904E750001001A"
630 DATA "06504F4B455F2400","00000001005C0650"
640 DATA "45454B5F24000000"
650 DATA "70F1220D928B0481","0000001066000040"
660 DATA "48E70014518D3078","01184E9066000030"
670 DATA "287698004CDF2800","508B307801164E90"
680 DATA "6600001C36369800","38C352430243FFFE"
690 DATA "548938F698005543","6600FFF642804E75"
700 DATA "307801184E906600","004670F1B67C0001"
710 DATA "6600003C28769800","3214564102810000"
720 DATA "FFFE28013078011A","4E90226E005893C4"
730 DATA "2D490058321C3D81","980054891D9C9800"
740 DATA "528951C9FFF8226E","005878142804E75"
750 DATA "*",15036
```

•Figure Two

will have to initialise the extension routines. If, say, you had saved the machine code in the file "mdv1_strings_obj", you would use the following commands to initialise the routines:

space = RESPR (200)
LBYTES mdv1_strings_obj,space
CALL space

You can easily check that everything has initialised correctly by typing:

100 poke_$ location, string

in lower-case. This should appear in the program with the POKE_$ in upper-case.

We have had plenty of feedback from readers asking for all kinds of procedures and functions.

Suggestions

Many are available in the majority of commercial toolkits so we are avoiding them, but a number of novel suggestions have been put forward which we will be covering during the next few months.

```
100 REMark : POKE_$ & PEEK_$ Demo Program
110 :
120 space = RESPR(100)
130 REPeat string_loop
140     INPUT"Enter string (max 98 chars)...";s$
150     PRINT"Poking string to memory..."
160     POKE_$ space,s$
170     PRINT"Corrupting string..."
180     s$ = "*****"
190     PRINT"s$ now equals '";s$;"'"
200     PRINT"Peeking string from memory..."
210     s$ = PEEK_$(space)
220     PRINT"s$ now equals '";s$;"'"
230     PRINT
240 END REPeat string_loop
```

•Figure Three

CONNEXIONS

Colin Opie looks at the Qontrol board and the nature of digital and analogue systems

In this penultimate part of the Connexions series we look at the features available on the first Qontrol-II board. We shall also look at the basic nature of digital and analogue signals and why they must be treated separately. In the final part next month we shall look at some real circuits and ideas for experiments. That will finish the Connexions series but as Qontrol-II board applications are taken up by users we will be bringing you detailed notes of them in future issues of *QL World*.

This board can be used very simply by plugging it into your QL and taking advantage of the excellent Control-SuperBasic extensions built into the board's ROM. For those with assembly language skills and the need for high-speed data transfers, a number of vectors can be accessed which support direct programming of the major I/O chips.

Either way, there will be some people who would like to be shown some of the applications possible in terms of concrete examples. There are also some who have been waiting for the board to arrive, knowing exactly how they are going to use it in their own field. That is the advantage of the analogue/digital I/O Qontrol-II board, its versatility.

On the digital side of things you have an entire Versatile Interface Adapter chip at your disposal. It is a programmable device which supports 16 configurable data lines, four multi-purpose control lines, shift register faciities and two timers. The two 16-bit timers are capable of performing up to four tasks, though the number of options available on any one timer is fewer. All lines are TTL-compatible.

Up to eight high-speed analogue input channels are also available, each channel having a sample rate of more than 1,500 samples per second. The A/D chip works by sampling each of the analogue inputs in rotation and therefore, with a common signal to all inputs, an absolute maximum signal sampling rate of exactly 12,500 samples per second can be achieved. Each of the channels operates with a 10V reference (fsd) into 8 bits — i.e., precision of 39.22 millivolts — and a 10V reference voltage is available on the appropriate socket.

Now to the board design — see figure one. As we know there is a 16K block of memory allocated in the QL memory map to each expansion board plugged in. At the bottom end of this allocated block it is assumed that some software will exist — within a ROM physically present on the board. This software will initialise any I/O chips as necessary, set up device driver links to Qdos and extend any SuperBasic as required. Above the software will go the memory-mapped I/O devices.

To make the address decoding very simple for the Qontrol-II board the 16K block was split into four 4K regions. The bottom two regions are assigned to the 8K EPROM holding the software and the next two regions are allocated to the digital VIA and analogue/digital chips respectively. The VIA needs only 16 addresses to program it fully and the A/D chip a mere eight addresses. Is this a waste of allocated space? In this particular application the answer is clearly no. The board design is fairly simple and the software fits comfortably in an 8K ROM, so there is little point in making the address decoding any more complicated. The offset addresses for the three chips from the base address of the board are therefore as in figure 3:

The base address of the board, of course, will depend on which slot it is plugged into. When plugged directly into the side of a QL, with no motherboard enhancement this base address will be $C0000. Knowing that does not imply that PEEKing and POKEing various addresses is the best way to go about things — the opposite is advised. The software supplied in the board's ROM contains numerous utilities which make access to the board base-address independent. In most cases they would be the most appropriate avenue for use of the facilities on offer.

Most of the phenomena we can sense naturally, such as temperature, light, sound and so on, are analogue in nature. They have an infinitely-variable range of intensity with no great leaps between one possible level and the next — see figure 2a. This is of no direct use to a digital computer system which works with binary digits. Suppose we use a single memory location of eight BInary digiTS — bits — to store a range of analogue intensities. The values which can be assigned to such a memory location are digital in nature and can be '0', '1', '2', and so on up to '255'. This means that each digital value corresponds to a range of analogue values which cannot be represented more precisely — see figure 2b.

This principle of precision is very important. It is a measure of how much a signal can change before the monitoring instrument shows that such a change has occurred. Note that this is not the same as accuracy, which is the monitoring instrument's ability to supply a reading correct to some internationally-agreed rule

Earlier it was mentioned that the Qontrol-II A/D chip uses an 8-bit convertor. The chip also uses a 10V reference for its conversion process. This means that if the analogue voltage presented to one of the inputs is zero volts, the binary value of zero would be stored as the voltage intensity. If 10VV is applied to the input, the binary value of-255 — i.e., full scale — would be stored as the voltage intensity. The precision of the system is therefore 10V/255 = 39.22 mV.

Digital inputs and outputs from a digital computer system are, naturally enough, straightforward. All that is required is some type of addressable chip which is willing to act as protector/store of all signals flowing in and out. There are a number of digital signal standards in common use — e.g., CMOS, TTL and ECL. Transistor-Transistor-Logic levels are by far the most common for interfacing control applications to microcomputers. Figure 4 shows

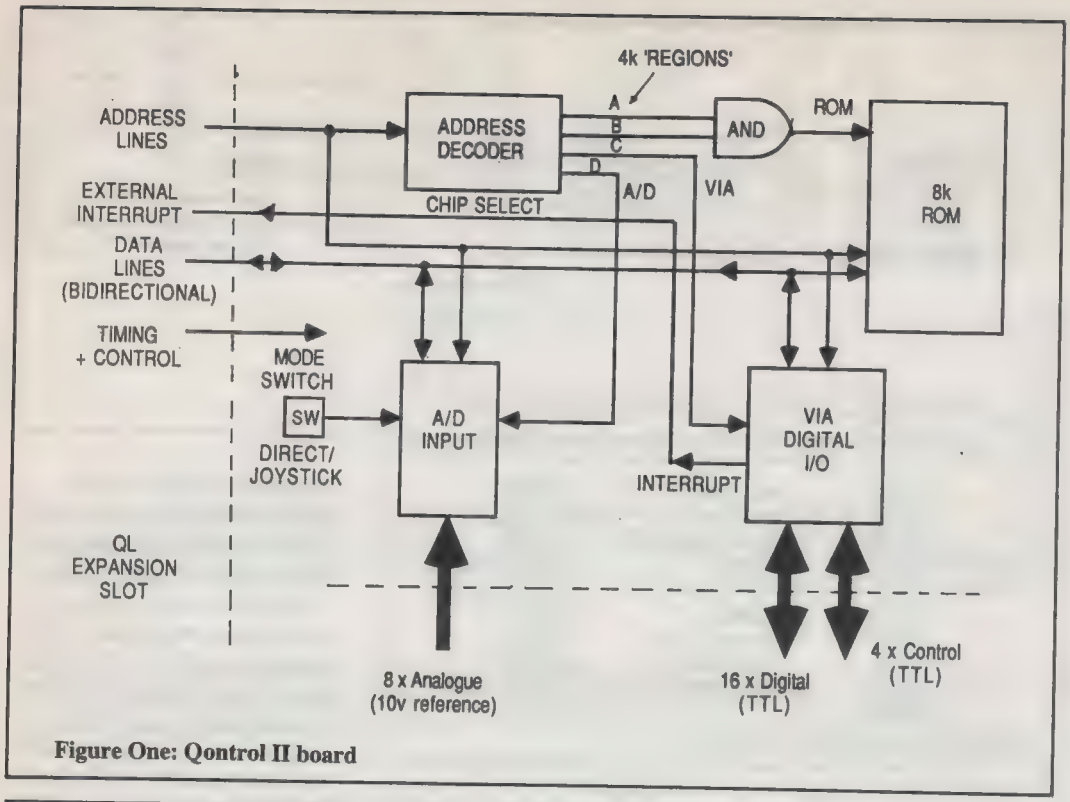


Figure One: Qontrol II board

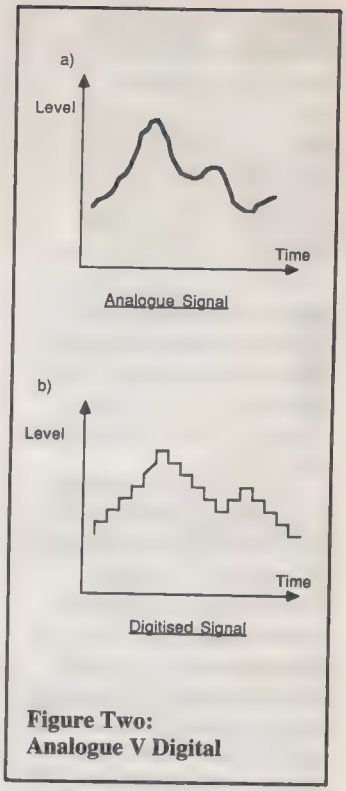


Figure Two: Analogue V Digital

Offset address	Chip
$00000	
— $01FFF	*EPROM (software)*
$02000	
— $0200F	*VIA (digital I/O)*
$02010	
— $02FFF	*— not used —*
$03000	
— $03007	*A/D (analogue i/p)*
$03008	
— $03FFF	*— not used —*

Figure Three:

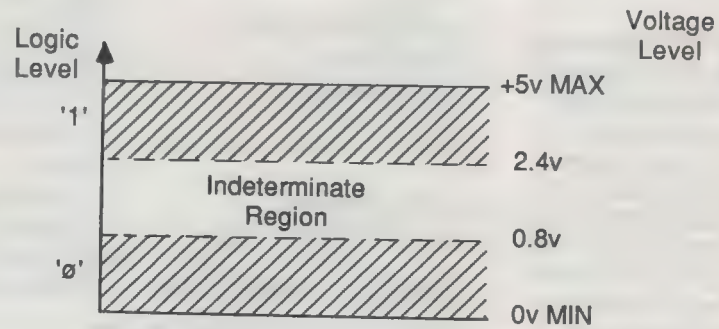


Figure Four: TTL Digital' Signals

the nature of a TTL signal. Note that for the computer to see a low ('O') level the incoming voltage must be less than 0.8V but not negative. To see a high ('1') level the signal must be greater than about 2.4 and less than 5.0. Anything between 0.8V and 2.4V is treated with great suspicion and anything could happen.

To go negative or go above 5.0V is asking for trouble and you could well destroy the chip. The main problem with digital signals, particularly when using one as an output from the computer system, is that it has very little power associated with it. Just because your radio needs at least 3V to run, do not expect to be able to couple a TTL output directly from your computer to the battery terminals of your radio and assume you can then program the interface to turn on your radio at a pre-set time automatically.

The foregoing has served only to highlight a number of problems we might meet when attempting to interface some external device to our computer — see figure 6. One of the problems often encountered is speed matching — making sure that we can receive or transmit digital data at the same rate as the device.

Protocol is concerned with making sure that received and transmitted signals have the correct format and timing about them. In other words, we must be sure that we know what kind of signal is coming in and how to deal with it. Alternatively, we must send appropriate signals to any particular device for it to work as expected.

Current drive capability and voltage level compatibility are paramount in control applications. Let us take a single TTL signal linked to a 12V mains relay — see figure five. The purpose of the set-up is to be able to switch mains-powered devices on and off by using the computer as the controller. The computer has to activate or de-activate the coil of the relay switch to achieve this.

Two problems exist. The TTL output voltage of

around 3.4V is not high enough to match the 12V needed by the relay coil. Second, the TTL output would not have the current drive capability to energise the relay. So we need a matching circuit. In this example the circuit would consist of no more than a high gain transistor but I hope you see the principle that at times an extra piece of electronics is needed between the device and the computer.

Our Qontrol-II interface board has eight A/D input lines, 16 digital lines and four control lines — digital. Exactly how we allocate those resources in any one application is not always straightforward. Once again there is sometimes the need for a little external circuitry to enable an application to be serviced with the resources available.

There is no possible way that this series can instruct you in all the details about interfacing devices to computers but I hope you will have received a flavour of what is involved. If you would like to go into things in more detail, a visit to a local bookshop, computer retailer or electronics hobby shop should enable you to find a suitable book from which to start your studies. To spend a little time doing that will reap great rewards and will open a new dimension to you in the realms of computer programming and control.

The routines available in the Qontrol-II interface ROM are well-documented in a booklet you receive when you buy the board. Without the board, knowledge of the routines will be fairly academic as you will not be able to use them. In the interests of contradiction and blatant advertising it is worth looking at what is on offer.

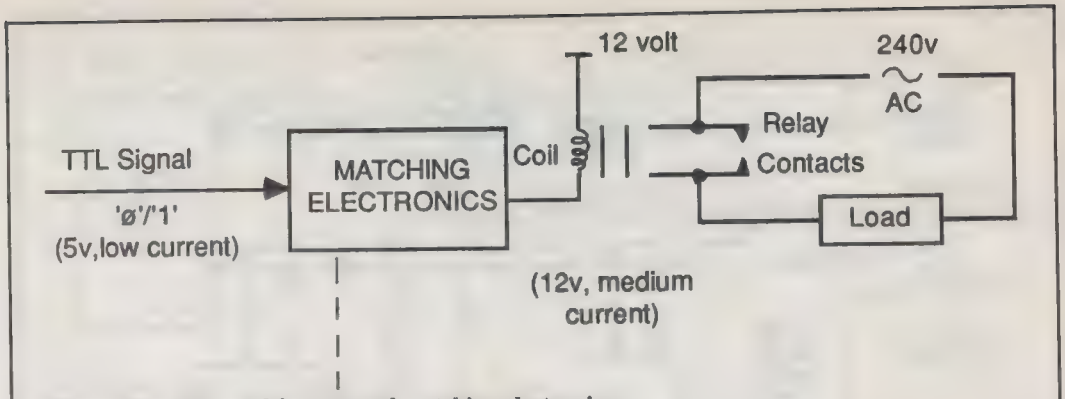


Figure Five: The need for external matching electronics

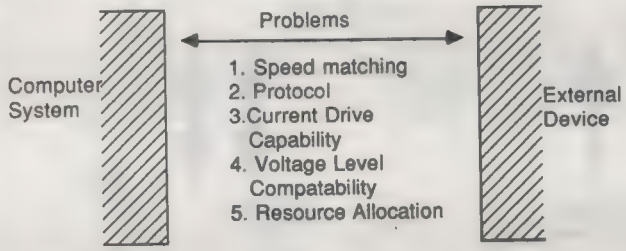


Figure Six: Interfacing problems

PORTSET	— Set simple I/O port mode
WRVIA(addr,value)	— Write to a VIA port
RDVIA(addr)	— Read a VIA port
TSTBIT(port,bit)	— Test port bit status
SETBIT(port,bit,val)	— Set port bit status
FREERUN(delay,enable,go)	— *Create free-running waveform*
COUNT(pulses)	— Count incoming pulses
WCOUNT(control, input)	— Controlled count of incoming pulses
GRAB(port,samples,buffer)	— Collect samples into buffer

Figure Seven: VIA Support routines

The Versatile Interface Adapter has 16 addresses associated with it, all used in one waya or another to support the many facilities available. To get the best from the chip in all circumstances you would need to know how to program it. To that end there is a routine which will return the base address of the VIA. You add 0 to 15 to this value depending on what you want to do and at what internal chip address. Other VIA support routines include those in figure 7:

All those routines have vectors for use by assembly language programmers. You may also open the ports as devices to be allocated to a channel. The port device names are **'port0'** and **'port1'.** Those device names can be followed by a number of letters, for example **'i'**, which sets the port as an input port. You can also set a number of standard transmission protocols. These routines are all fairly elementary but there are others such as:

LOGICANAL(waveforms,channels,port,rate)

which is a built-in logic analyser allowing you up to eight displays on the screen from either of the two ports.

The A/D chip uses eight addresses, one for each A/D channel available. There are two ways of reading the current digitised value for any one channel. You can use the routine which will return the base address of the A/D chip and then PEEK addresses from that point to the same point plus seven. Alternatively you could open a channel named **'atodO** to **'atod7'** and input values from that channel. As with the digital side of things there is also the command:

DIGISCOPE(waveforms,channels,rate)

which supplies automatic waveform displays for up to four channels at a time. There is also automatic waveform displays for up to four channels at a time. There is also the equivalent of GRAB, called **ADGRAB**, for collecting samples into a buffer area.

In summary, the facilities offered by the software will enable you to control any number of devices easily, use your QL as a digital scope or logic analyser or create custom experimental software. There is also a graphics dump routine for dumping screen displays to Epson printers and compatibles.

CONNEXIONS

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Direct access

Many QL owners have improved the reliability of their systems by fitting a disc drive but the facility for using direct access, often called random access files, is not clear.

I upgraded to a QL from a Sharp MZ-80K fitted with disc drives and was able to use commands such as XOPEN £47, FD2, "ADDRESS FILE", and to READ with INPUT £47 (*7-6),N1$,N2$,3$,N4$,N5,-N6$,N7$, with a similar PRINT command to write direct to the file. Is there such a facility available to the QL user?

My disc interface has a number of commands appropriate to discs, such as FPOS,BPUT,BGET, but I cannot see how to use them in a program requiring direct access. Can you help? Even fixed 16-bit length records would be better than the delays now experienced with sequential access. A sample program would be very helpful.

G.H.Bent, Corby, Northamptonshire.

File change

I have encountered one problem when writing a business set of programs in SuperBasic. I wish to load files using OPEN#–IN, mdv 1–filename and adjust them but do not know how to, except to alter the specific part of the file after loading the whole of the file. One then has to delete the whole file from microfile while in QL memory and set up a new one using OPEN#–NEW, mdv1–filename. This takes a good deal of time and the memory space is not available in an unexpanded QL to keep other things in memory as well.

Please inform me if there is a way of changing parts of array files more satisfactorily.

Jeremy Harrison, Stombridge.

Provided you have access to an extended disc interface ROM, such as that owned by Bent, or a good Toolkit ROM, you can perform direct access to files — disc or Microdrive — very easily.

The important point when dealing with direct access — random access — files is that for your sanity you should keep to fixed record lengths. Programming languages such as Pascal force this methodology on you but SuperBasic does not. Let us look at an example record structure, e.g., for the ubiquitous names and addresses file. We could decide on:

```
record
  name: string(30);
  addr1: string(30);
  addr2: string(30);
  addr3: string(30);
  pcode: string(10);
  Telno: string(30)
end;
```

In terms of pure data this would give us a record length of 160 bytes — characters. Each field in the record could be implemented in SuperBasic using the variables:

```
DIM
name$(30),addr1$(30),....,
  telno$(30)
```

When inputting new record data from the keyboard, a simple routine could be written to ensure that assigned values were inside the permitted field width for each field in the record. If we open a file using the *OPEN#n,‹filename›* option within toolkits we will be allowed both to read from and write to a file. Compare this to the commands *OPEN–IN* and *OPEN–NEW* which only permit reading and (original) writing of files respectively.

Once a file is opened for reading and writing, we can position the file input/output pointer to any particular record by using the short version of the *BGET* command. Is this pointer value multiples of the record data size? Well, it depends, but for the sake of speed it is not usually the case.

```
100 REMark Simple Random Acces File Demonstration
105 datalen=160: fields=6: reclen=datalen+fields: fo=0:
    cf$='unknown'
110 DIM name$(30), addr1$(30), addr2$(30), addr3$(30), pcode$(10),
    telno$(30)
115 :
120 REPeat menu
125   CLS:PRINT 'ADDRESS FILE'\'Book: ';cf$\\
130   PRINT \'1. Create new address book'
135   PRINT \'2. Open an address book'
140   PRINT \'3. List names v. record number'
145   PRINT \'4. Display an address record'
150   PRINT \'5. Edit an address record'
155   PRINT \'6. Close and finish'
160   PRINT \\'Enter option: ';:INPUT opt
165   SELect ON opt
170     =1: create
175     =2: opfile
180     =3: listnames
185     =4: showrec
190     =5: edrec
195     =6: IF fo=1:CLOSE#3
200         STOP
205   END SELect
210 END REPeat menu
215 :
220 DEFine PROCedure create
225 CLS:INPUT'Name of book to create?  ';cf$
230 IF fo=1:CLOSE#3
235 DELETE cf$: OPEN_NEW#3,cf$
240 INPUT'Max. no. of address records?  ';rn
245 name$='*blank'&FILL$('  ',12): addr1$=FILL$('  ',15):
    addr2$=addr1$(1 TO 30): addr3$=addr1$(1 TO 30): pcode$=
    FILL$('  ',5): telno$=addr1$(1 TO 30)
250 FOR loop=1 TO rn: writerec: NEXT loop
255 CLOSE#3: OPEN#3,cf$
260 PRINT \'File size: ';FLEN(#3);' bytes'
265 PRINT 'Press any key to continue'
270 fo=1: d$=INKEY$(-1)
275 END DEFine
280 :
285 DEFine PROCedure writerec
290 PRINT#3,name$(1 TO 30)\addr1$(1 TO 30)
295 PRINT#3,addr2$(1 TO 30)\addr3$(1 TO 30)
300 PRINT#3,pcode$(1 TO 10)\telno$(1 TO 30)
305 END DEFine
310 :
315 DEFine PROCedure readrec
320 INPUT#3,name$,addr1$
325 INPUT#3,addr2$,addr3$
330 INPUT#3,pcode$,telno$
335 END DEFine
340 :
345 DEFine PROCedure opfile
350 CLS:INPUT'Name of book to open?  ';cf$
355 IF fo=1:CLOSE#3
```

HELPLINE

When writing any particular record structure, as depicted, it is easiest and quickest in all respects to do so using a series of *PRINT#n* statements. This means, at least so far as the QL is concerned, that a *'line feed'* character will follow each field written. In our simple example we would therefore be positioning the pointer to multiples of 166 bytes, e,g., *BGETĥ/166* (for record #2), *BGET#n/332* (for record #3) and so on.

The program listing in figure one is a complete direct access — random access — address book handler. It is very simple in concept and in facilities offered but it is sufficient for the purpose of demonstration and it could easily be expanded.

In line 105 we present our record size. The data length is 160 and there are six fields, so the total length of a record is the sum of these. Variables *'fo'* and *cf$'* are used to let the program know when an address book file has been opened and what it is called respectively. Line 110 contains the field dimension declarations. Lines 120 to 210 are fairly obvious and form the main menu-orientated loop of the whole program.

Procedure *'create'* — lines 220 to 275 — is used to allocate disc or Microdrive space to the random access file. It does so by requesting the maximum number of records you wish to store and using the number supplied to write sequential 'empty' records.

This is a fairly standard approach for simple systems. Qdos will return an 'end-of-file' error if you try to perform automatic file length extension by specifying a record position further on than the current end. That is why we must create a fixed length file. If you keep to fixed length records in a fixed length file, your random access programs will always be relatively simple to write. Note that in line 235 we can use *'OPEN–NEW'* because we are creating a simple sequential file at this point. In line 260 the function *'FLEN'* is used to inform you of the size of the file just created. From this you will be able to confirm that each record takes 166 bytes.

Procedures *'writerec'* and *'readrec'* — lines 285 — perform the record writing and reading respectively. It is assumed that the file record pointer is set correctly before either of these routines is called.

Procedure *'opfile'* — lines 345 to 380 — enables you to open a file for reading and writing. Note therefore the use of *'OPEN'* in line 360. The function *'FLEN'* is used again in line 365, this time divided by the record length, to remind you of the maximum record capacity of the file in question.

Procedure *'listnames'* — lines 390 to 435 — will read each record in the file and display the name of the person against the record number. That is useful in two respects. First, it tells us which record entries are still empty. Second, it tells us the record number for someone on whom we are trying to get information. Once the latter is known, the procedure *'showrec'* — lines 445 to 480 — can be used to display the record contents.

Also we can use the information given to us by 'listnames' to select a record to edit using the *'edrec'* procedure — lines 490 to 610. This procedure, though it looks long, simply displays the current field contents of the record selected and allows you to change it. Pressing *'ENTER'* will leave the field as it was previously. Entering new records and editing old ones, perhaps due to a change in address but not name, are therefore seen to be equivalent operations.

To do this the routine first sets the file pointer to the beginning of the record using the short form of the *'BGET'* procedure — see line 500 — and reads it. Editing is then performed. Finally, the *'BGET'* procedure is used again in line 595 to re-set the file pointer to the beginning of the record and the new field contents are written to the file.

Remember that these operations can be performed only if you have a toolkit or an equivalent set of commands in a disc interface ROM. So long as you have the extensions to SuperBasic needed, it does not matter whether you use Microdrives, discs or silicon RAM disc for your file space.

```
360 OPEN#3,cf$
365 PRINT \'Book size: ';FLEN(#3)/reclen;' records maximum'
370 PRINT 'Press any key to continue'
375 fo=1: d$=INKEY$(-1)
380 END DEFine
385 :
390 DEFine PROCedure listnames
395 CLS: bs=FLEN(#3)/reclen
400 FOR lp=1 TO bs
405   BGET#3\(lp*reclen)-reclen
410   readrec
415   PRINT lp;TO 5;name$
420 NEXT lp
425 PRINT \'Press any key to continue'
430 d$=INKEY$(-1)
435 END DEFine
440 :
445 DEFine PROCedure showrec
450 CLS: INPUT'Address record to display? ';lp
455 BGET#3\(lp*reclen)-reclen
460 readrec
465 PRINT\\name$\addr1$\addr2$\addr3$\pcode$\telno$
470 PRINT \'Press any key to continue'
475 d$=INKEY$(-1)
480 END DEFine
485 :
490 DEFine PROCedure edrec
495 CLS: INPUT'Address record to edit? ';lp
500 BGET#3\(lp*reclen)-reclen: readrec
505 AT 3,0:PRINT'Name:'\'[';name$(1 TO 30);']'
510 AT 4,1:INPUT r$: m=LEN(r$): IF m>0:name$=
    FILL$(' ',15):name$(1 TO m)=r$(1 TO m)
515 AT 4,1:PRINT name$(1 TO 30)
520 AT 5,0:PRINT'Address-1:'\'[';addr1$(1 TO 30);']'
525 AT 6,1:INPUT r$: m=LEN(r$): IF m>0:addr1$=
    FILL$(' ',15):addr1$(1 TO m)=r$(1 TO m)
530 AT 6,1:PRINT addr1$(1 TO 30)
535 AT 7,0:PRINT'Address-2:'\'[';addr2$(1 TO 30);']'
540 AT 8,1:INPUT r$: m=LEN(r$): IF m>0:addr2$=
    FILL$(' ',15):addr2$(1 TO m)=r$(1 TO m)
545 AT 8,1:PRINT addr2$(1 TO 30)
550 AT 9,0:PRINT'Address-3:'\'[';addr3$(1 TO 30);']'
555 AT 10,1:INPUT r$: m=LEN(r$): IF m>0:addr3$=
    FILL$(' ',15):addr3$(1 TO m)=r$(1 TO m)
560 AT 10,1:PRINT addr3$(1 TO 30)
565 AT 11,0:PRINT'Postcode:'\'[';pcode$(1 TO 10);']'
570 AT 12,1:INPUT r$: m=LEN(r$): IF m>0:pcode$=
    FIL'.$(' ',15):pcode$(1 TO m)=r$(1 TO m)
575 AT 12,1:PRINT pcode$(1 TO 10)
580 AT 13,0:PRINT'Telephone:'\'[';telno$(1 TO 30);']'
585 AT 14,1:INPUT r$: m=LEN(r$): IF m>0:telno$=
    FILL$(' ',15):telno$(1 TO m)=r$(1 TO m)
590 AT 14,1:PRINT telno$(1 TO 30)
595 BGET#3\(lp*reclen)-reclen: writerec
600 PRINT \'Press any key to continue'
605 d$=INKEY$(-1)
610 END DEFine
```

PSION SOLUTIONS

Ron Massey digs into the bulging mailsack for your queries on the various Psion programs in circulation and offers instant help in these pages.

Watch the saves

In response to queries concerning Archive, Chas Dillon offers the following hints: "Archive file-saving options, although similar, work in different ways. If you produce a collection of PROCs and input "SAVE drive filename", the procs will be saved as a text file. The file will also be appended with "—prg". Loading this type file back into Archive is similar to loading a SuperBasic program; it is slow.

"Saving the procs using the "SAVE OBJECT drive filename" will save the file in a tokenised form used internally by Archive. The process is roughly analogous to compiling a Basic program. This type of file is appended with "—pro", takes up more media space, but can still be modified after re-loading it into Archive.

"If a file is saved with the command "SAVE PROTECT drive filename", it is also appended with "—pro", but cannot be listed or in any way modified.

"This type of file should be used only a), If you have spent a considerable amount of time developing meaningful Archive routines which you want to protect; and b), only if you are very sure that you will not want to modify them at some future date; and c), only if you have also saved them as "—prg" files, as well.

"With the possible exception of accessibility and loading time, for a large PROC file, the end-user is unlikely to notice any difference between either of the three SAVE variations."

Two queries concern page 43 of the User Guide, the Archive DISPLAY command. Dillon assures me that, in spite of the User Guide statement to the contrary, there is no way of getting the system to tell in what fields a file is ordered. Ordered records are displayed when the NEXT or BACK commands are used with the program.

Clever Dixons chap

Thanks to Peter Chambers of Gap Software for bringing the following listing, originated by a knowledgable member of Dixon's staff, to my attention. With *Quanta* permission, the listing, which appeared in the September 1986 edition of its newsletter, is reprinted.

This small SuperBasic program will modify the Psion GPRINT-prt graphic dump for use with the 8056 printer. Assuming your source drive is mdv1—:

```
10 REMark ** Save the original GPRINT—prt first *
20 COPY mdv1—GPRINT—prt to mdv1—Orig-GPRINT-prt
30 REMark ** Put GRPRINT—prt into a location (addr) in memory *
40 addr=RESPR(512): LBYTES mdv1—GPRINT—prt, addr
50 REMark ** Delete the original GPRINT-prt file *
60 DELETE mdv1—GPRINT—prt
70 REMark ** Once in memory, modify the program with *
80 POKE—W addr + 400,6960
90 POKE—W addr + 402,0
100 POKE—W addr + 404,6987
110 POKE—W addr + 406,57345
120 POKE—W addr + 181,50
130 POKE—W addr + 474,33280
140 POKE—W addr + 496,7
150 POKE—W addr + 500,5
160 REMark ** Save the modified program using the **
170 REMark ** following parameters
180 REMark ** drivename—filename, memory location, file length **
190 SBYTES mdv1—GPRINT—prt, addr, 512
```

The program will customise the graphics driver for use with the 8056 printer. Once the modified routine has been saved — line 190 — re-set your QL. Put your Easel back-up into mdv1— and type:

LOAD mdv1—boot

Once loaded, type "LIST". If your listing starts with line 1, type-in RENUM. The listing will then start from the line 100. In order, type in the following commands, pressing ‹ENTER› after each line:

```
10 BAUD 1200
RENUM 1,1
DELETE mdv1—BOOT
SAVE mdv1—BOOT
```

If you wish to start up Easel at this point, type-in RUN, make a few numerical entries in the program and enter the Easel PRINT mode to test the dump.

Truth about RAM, disks and Quill

One reader, commenting on David Hawthorne's observation in his article about disc drives in the May issue that Quill required at least 64K extra RAM to run when disc drives were fitted was incorrect – he has reached an erroneous conclusion.

Since the letter says that it is possible to have the entire Psion suite on the same disc, it would appear that some confusion has arisen in the writer's mind with regard to Hawthorne's report.

The operative part of Hawthorne's statement says that if you do not have the minimum memory expansion com-

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Include your name, age and full address.

mercially available fitted to your QL and you have fitted disc drives, Quill will not run. What Quill does, in fact, is to attempt to open a def—tmp file for its own code space and then announces that it cannot start.

The letter details a useful method of organising a system in which the volume of media space available to disc-based makes it possible to have a large number of programs started from a master BOOT.

Future editions of Psion Solutions will examine various methods of organising efficient systems usefully for utilising time and disc space.

A Quill screen may be viewed as a 40-64-or 80-column display and what is viewed on the screen bears no relation to the number of characters per line a printer will reproduce.

Quill documents of any line length, printer limitations not withstanding, are produced by setting the margins to the required document width. The command sequence is ‹F3,›,‹M›. Pressing ‹SPACE› will select left margin, indent margin and right margin respectively.

Margins may be set in a document for individual paragraphs or lines by selecting the margin setting mode with the cursor at the required line position.

Avoid the horrible risks

Further to last month's query regarding adding to the number of translates available in *INSTALL—bas*, Dillon has examined the limitations of Quill, Abacus and Archive. The conclusion is that because of the structure of the printerdat file and the requirements of the Psion programs, it is not possible — at least not without the distinct risk of doing something horrible at the end of a valuable document.

As supplied, the instal—bas program provides facilities for up to 21 translates — three for setting-up the printer, a second group of eight for use with Quill built-in character graphics, and a third set of 10 spare translates.

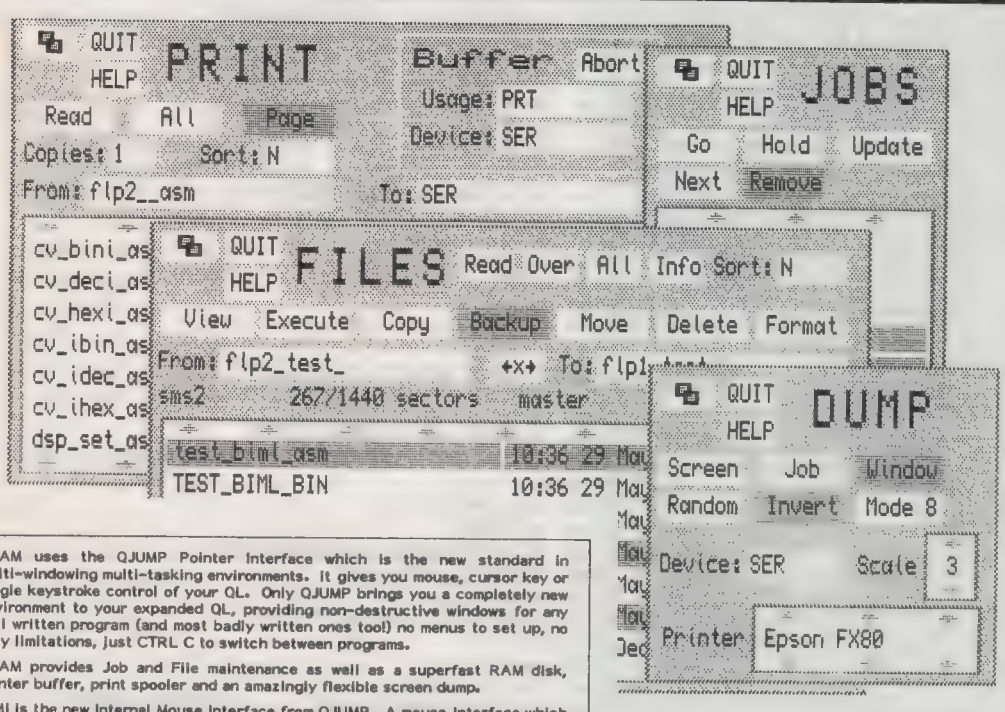
The first group, providing facilities for sending end-of-line code, preamble and postamble codes, should not be used for anything but their intended purpose. Although the second set is indicated as dedicated translates, they can be used, however required. Since I do not normally use sub or superscript, I have used them for switching to italics and condensed respectively for my Quill driver. The remainder of the second set is used as indicated — UNDERLINE and BOLD.

I use the third set of translates for expanded type, the degrees symbol, sub and superscript and so on. The preamble code for my Abacus driver sets my Canon printer in condensed mode. None from the second group of translates is usable in Abacus and it is sometimes useful to have BOLD and EXPANDED available; they are put into the third group of translates.

My Archive driver, similar to Abacus, caters for a different set of requirements and is set up accordingly.

The CuePrint system, reviewed in the June Utility File, is supplied with extensive sets of NLQ-printing characters in Greek and mathematical notation, among others in its repertoire. In addition, CuePrint provides an extensive translate facility completely separate from Quill.

Alternatively, users requiring a large number of translates and/or versatile page formatting/merging, may wish to consider using the extensive translate facilities available in QATS output control module.



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QRAM uses the QJUMP Pointer Interface which is the new standard in multi-windowing multi-tasking environments. It gives you mouse, cursor key or single keystroke control of your QL. Only QJUMP brings you a completely new environment to your expanded QL, providing non-destructive windows for any well written program (and most badly written ones too!) no menus to set up, no silly limitations, just CTRL C to switch between programs.

QRAM provides Job and File maintenance as well as a superfast RAM disk, printer buffer, print spooler and an amazingly flexible screen dump.

QIMI is the new Internal Mouse Interface from QJUMP. A mouse interface which leaves all of the QL's expansion facilities free for other peripherals. QIMI fits right inside the QL. Tools are supplied. QIMI may not be suitable for USA or German QLs. QIMI is compatible with the ATARI mouse but QJUMP can supply a higher quality mouse.

QRAM	£29.90 (£26.00 export)	Available on Mdv / 3½ / 5¼
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QEP III The "Rolls Royce" (Sinclair User) of EPROM programmers. Many QLs have been bought just to use QEP III. Programs EPROMs 2716 through to 27512. Too many facilities to describe here.
QEP III — £129.95 (£113.00 export)

QFLP floppy disk driver - this you should not need. QJUMP can supply floppy disk drivers for those who have been left with unsupported floppy disk systems. Available for Medic (gets round many of the faults on some of the early Medic disk drives) and MicroPeripherals, version 3 or version 5 (provides compatibility with the rest of the QL world and improves performance).
QFLP — £14.95 (£13.00 export) — Available for Medic MP3 MP5

THE P+R:O=G<S

If you have a program that is worthy of consideration, send it to 'The Progs', Sinclair QL World, Greencoat House, Francis Street, London SW1P 1DG. We pay for everything published at the usual page rates — £80 per thousand words.

Program of the month

QWHIST by John Wakefield

At the start of each session the pack is formed by reading data statements at line 6270. Subsequent packs are formed using the order in which the previous pack was left after shuffling.

At line 230, trumps are decided initially and thereafter index clockwise from hand to hand. A number of channels are used during the game and they are allocated as follows:

3 — *Initial credits.*
4 — *Green backcloth.*
5 to 17 — *South player's card display.*
18 — *Trumps display.*
19 — *South's selection arrow.*
20 — *Information/instruction window.*
22 — *West's card position.*
23 — *North's card position.*
24 — *East's card position.*
25 — *Left score window.*
26 — *Right score window.*

At the start of play, the cards are shuffled in PROCedure 'shuffle' and dealt to each player one at a time, in PROCedure 'deal'. South displays the cards in the order dealt, then sorts them into suit order — hearts, clubs, diamonds, spades — using the PROCedure 'suit_sort', and finally into highest-card-first order, keeping the same suit order, with the PROCedures 'number_sort' and 'sort_num'.

The same sequence is then applied to West, North and East respectively but with no visual display.

Each time a suit is requested one of four PROCedures is called which forms the required shape — hearts, clubs, diamonds or spades. The main PROCedure, 'play_game' starts at line 3600.

At each player's turn, it is necessary to decide which of the cards contained in that hand are to be laid. Excepting times when it is South's turn, where the player decides, the PROCedure 'decide_lead_card' determines the first card of the trick by choosing the highest card held. Subsequent cards are decided by the PROCedures 'decide_card', 'trump_discard', 'throw_away', 'lowest_trump', and 'over-trump'.

Each of the decision PROCedures can call one or more of the others, which allows the ultimate decision to be made by consideration of multiple factors. The various decisions made are not always perfect, which simulates human error to some extent, but could be improved, if desired, by writing further conditions.

An instance of this would be as when playing a real game of whist; the players keep a mental note of all cards laid, therefore being able to determine with what the opponents and partner are left. This factor can assist in knowing when to trump, throw away or lead a low card.

During each trick played, the winning hand so far is recorded by the PROCedure 'high_card'. The resultant string 'high_card$' is then used to enable the next decision to be made and also points to the winner of the trick when all four cards have been played.

The PROCedures 'move_arrow' and 'arrow' are concerned with selecting the card when South is playing. A 'skip' system has been built into these procedures to prevent the player revoking. The arrow can stop only at legal positions.

```
100 MODE 4
110 OPEN #3,scr_512x256a0x0
120 PAPER #3,1:INK #3,7:CLS #3
130 CSIZE #3,3,1
140 AT #3,6,12:PRINT #3,"QWHIST"
150 CSIZE #3,1,0
160 AT #3,20,20:PRINT #3, JOHN WAKEFIELD 1987"
170 DIM card$(52,3),hand$(4,39)
180 south=0:pro_tricks=0:contra_tricks=0:games_pla
yed=0:games_won=0:games_lost=0:stricks=0:ntricks=0
:etricks=0:wtricks=0
190 DIM pack$(156),new_pack$(156),follow_card$(3,3
),led$(4,3)
200 READ pack$
210 RESTORE
220 DIM south$(13,3),north$(13,3),east$(13,3),west
$(13,3),player$(13,3)
230 t=RND (1 TO 4)
240 DIM sort$(13,3)
250 OPEN #22,scr_37x50a10x103
260 OPEN #24,scr_37x50a465x103
270 OPEN #23,scr_37x50a238x10
280 OPEN #20,con_500x46a6x60
290 OPEN #25,scr_170x20a10x10
300 OPEN #26,scr_170x20a332x10
310 PAPER #25,3:CSIZE #25,1,1:INK #25,1
320 PAPER #26,3:CSIZE #26,1,1:INK #26,1
330 OPEN #4,scr_512x256a0x0
340 PAPER #4,5:INK #4,1
350 REPeat game
360 pos=10
370 shuffle
380 deal(3)
390 CLS #4
400 trumps
410 WINDOW #22,37,50,10,103
420 WINDOW #24,37,50,465,103
430 WINDOW #23,37,50,238,10
440 WINDOW #20,500,46,6,40
450 PAPER #20,7:PAPER #24,7:PAPER #22,7:PAPER #23,
7:INK #20,3
460 BORDER #20,1,1
470 CLS #20
480 IF NOT games_played THEN
490 display_rules(1)
500 ELSE
510 display_scoreboard(1)
520 END IF
530 mem%=1
540 card_display
550 CLS #25:PRINT #25,"     SORTING HANDS"
560 CLS #26:PRINT #26,"     SORTING HANDS"
570 suit_sort
580 card_display
590 mem%=0
600 number_sort
610 card_display:play_point(1)
620 IF NOT games_played THEN
630 display_rules(2)
640 ELSE
650 display_scoreboard(2)
660 END IF
670 deal(2)
680 suit_sort:number_sort:play_point(2)
690 IF NOT games_played THEN
```

```
700 display_rules(3)
710 ELSE
720 display_scoreboard(3)
730 END IF
740 deal(1)
750 suit_sort:number_sort:play_point(3)
760 IF NOT games_played THEN
770 display_rules(4)
780 ELSE
790 display_scoreboard(4)
800 END IF
810 deal(0)
820 suit_sort:number_sort:play_point(4)
830 t=t+1
840 IF t=5 THEN t=1
850 lead%=t
860 CLS #25:CLS #26
870 PRINT #25,"       FIRST HAND"
880 PRINT #26,"    YOU PLAY SOUTH"
890 PAPER #20,5:CLS #20:BORDER #20,1,5:CLOSE #20:C
PEN #20,con_200x26a156x62
900 WINDOW #20,200,26,156,62:BORDER #20,1,1:PAPER
#20,7:INK #20,3:CSIZE #20,3,1:CLS #20
910 PRINT #20,"    QWHIST"
920 play_game
930 games_played=games_played+1
940 END REPeat game
950 REMark ****************************
960 DEFine PROCedure shuffle
970 RANDOMISE
980 FOR n=1 TO 52
990 pos2 = RND(1 TO 53-n)*3
1000 BEEP 3000,pos2
1010 pos1 = pos2-2
1020 card$(n)=pack$(pos1 TO pos2)
1030 new_pack$(n*3-2 TO n*3)=card$(n)
1040 IF pos1>1 AND pos1<154 THEN
1050 pack$=pack$(1 TO pos1-1)&pack$(pos2+1 TO)
1060 ELSE
1070 IF pos1=1 THEN pack$=pack$(pos2+1 TO)
1080 IF pos1>153 THEN pack$=pack$(1 TO pos1-1)
1090 END IF
1100 END FOR n
1110 pack$=new_pack$(1 TO 156)
1120 END DEFine
1130 REMark ***************************
1140 DEFine PROCedure card_display
1150 FOR chan=5 TO 17
1160 chan%=chan
1170 c%=(chan%-5)*38+10
1180 OPEN #chan%,scr_510x50a2x204
1190 WINDOW #chan%,37,50,c%,204
1200 PAPER #chan%,7
1210 IF mem% THEN
1220 CLS #chan%
1230 ELSE
1240 CLS #chan%,4
1250 END IF
1260 BORDER #chan%,1,1
1270 card_value%=player$(chan%-4,1 TO 2)
1280 card_value$=card_value%
1290 ypos%=214:xpos%=c%+8
1300 IF card_value%=11 THEN card_value$="J"
1310 IF card_value%=12 THEN card_value$="Q"
1320 IF card_value%=13 THEN card_value$="K"
1330 IF card_value%=14 THEN card_value$="A"
1340 BEEP 3000,57-card_value%*4
1350 IF player$(chan%-4,3 TO 3)="B" THEN
1360 INK #chan%,3:PRINT #chan%,card_value$
1370 IF mem% THEN hearts
1380 END IF
1390 IF player$(chan%-4,3 TO 3)="D" THEN
1400 INK #chan%,3:PRINT #chan%,card_value$
1410 IF mem% THEN diamonds
1420 END IF
1430 IF player$(chan%-4,3 TO 3)="S" THEN
1440 INK #chan%,1:PRINT #chan%,card_value$
1450 IF mem% THEN spades
1460 END IF
1470 IF player$(chan%-4,3 TO 3)="C" THEN
1480 INK #chan%,1:PRINT #chan%,card_value$
1490 IF mem% THEN clubs
1500 END IF
1510 NEXT chan
1520 END DEFine
1530 REMark ***************************
1540 DEFine PROCedure hearts
1550 WINDOW #chan%,22,30,xpos%,ypos%
1560 IF south THEN PAPER #chan% ,5:ELSE PAPER #cha
n%,7
1570 CLS #chan%
1580 FILL #chan%,1
1590 ARC #chan%, 25,70 TO 0,60,PI*.8
1600 ARC #chan%,0,60 TO 25,15,PI/4
1610 LINE #chan%,25,70 TO 25,15
1620 FILL #chan%,0
1630 FILL #chan%,1
1640 LINE #chan%,25,70 TO 25,15
1650 ARC #chan%,25,15 TO 50,60,PI/4
1660 ARC #chan%,50,60 TO 25,70,PI*.8
1670 FILL #chan%,0
1680 WINDOW #chan%,37,50,xpos%-8,ypos%-10
1690 END DEFine
1700 REMark ***************************
1710 DEFine PROCedure spades
1720 WINDOW #chan%,22,30,xpos%,ypos%
1730 IF south THEN PAPER #chan% ,5:ELSE PAPER #cha
n%,7
1740 CLS #chan%
1750 FILL #chan%,1
1760 ARC #chan%,25,15 TO 50,25,PI*.8
1770 ARC #chan%,50,25 TO 25,70,PI/4
1780 LINE #chan%,25,70 TO 25,15
1790 FILL #chan%,0
1800 FILL #chan%,1
1810 LINE #chan%,25,70 TO 25,15
1820 ARC #chan%,25,70 TO 0,25,PI/4
1830 ARC #chan%,0,25 TO 25,15,PI*.8
1840 LINE #chan%,25,15 TO 30,0 TO 20,0 TO 25,15
1850 FILL #chan%,0
1860 WINDOW #chan%,37,50,xpos%-8,ypos%-10
1870 END DEFine
1880 REMark ************************
1890 DEFine PROCedure diamonds
1900 WINDOW #chan%,22,30,xpos%,ypos%
1910 IF south THEN PAPER #chan% ,5:ELSE PAPER #cha
n%,7
1920 CLS #chan%
1930 FILL #chan% ,1
1940 LINE #chan%,25,80 TO 0,40 TO 25,0 TO 50,40 TO
 25,80
1950 FILL #chan%,0
1960 WINDOW #chan%,37,50,xpos%-8,ypos%-10
1970 END DEFine
1980 REMark ************************
1990 DEFine PROCedure clubs
2000 WINDOW #chan%,22,30,xpos%,ypos%
2010 IF south THEN PAPER #chan% ,5:ELSE PAPER #cha
n%,7
2020 CLS #chan%
2030 FILL #chan%,1
2040 CIRCLE #chan%,25,58,12
2050 CIRCLE #chan%,10,34,12
2060 CIRCLE #chan%,40,34,12
2070 LINE #chan%,20,57 TO 15,0 TO 35,0 TO 20,57
2080 FILL #chan%,0
2090 WINDOW #chan%,37,50,xpos%-8,ypos%-10
2100 END DEFine
2110 REMark ************************
2120 DEFine PROCedure deal(hand%)
2130 FOR round = 4 TO 52 STEP 4
2140 BEEP 500,12,0,0,0,0,15
2150 IF hand%=3 THEN
2160 south$(round/4)=card$(round-3)
2170 east$(round/4)=card$(round-2)
2180 north$(round/4)=card$(round-1)
2190 west$(round/4)=card$(round)
2200 END IF
2210 player$(round/4)=card$(round-hand%)
2220 END FOR round
2230 END DEFine
2240 REMark ************************
2250 DEFine PROCedure suit_sort
2260 FOR symbol=1 TO 13
2270 c%=1
2280 FOR p=2 TO 13
2290 pp$=player$(p,3 TO 3)
2300 pc$=player$(c%,3 TO 3)
2310 IF pp$>pc$ THEN c%=p
2320 END FOR p
2330 sort$(14-symbol)=player$(c%)
2340 player$(c%,3 TO 3)="A"
2350 END FOR symbol
2360 FOR num=1 TO 13
2370 player$(num)=sort$(num)
2380 END FOR num
2390 END DEFine
2400 REMark ************************
2410 DEFine PROCedure number_sort
2420 start%=1:n=0
2430 FOR round=1 TO 4
2440 FOR num=start% TO 13
```

```
2450 IF round=1 AND "B" INSTR player$(num) THEN n=
n+1:sort$(n)=player$(num)
2460 IF round=2 AND "C" INSTR player$(num) THEN n=
n+1:sort$(n)=player$(num)
2470 IF round=3 AND "D" INSTR player$(num) THEN n=
n+1:sort$(n)=player$(num)
2480 IF round=4 AND "S" INSTR player$(num) THEN n=
n+1:sort$(n)=player$(num)
2490 END FOR num
2500 IF n>start% THEN sort_num
2510 IF n>13 THEN EXIT round
2520 start%=n+1
2530 END FOR round
2540 END DEFine
2550 REMark **************************
2560 DEFine PROCedure sort_num
2570 FOR order=start% TO n
2580 c%=start%
2590 FOR p=start%+1 TO n
2600 pp%=sort$(p,1 TO 2)
2610 pc%=sort$(c%,1 TO 2)
2620 IF pp%>pc% THEN c%=p
2630 END FOR p
2640 player$(order)=sort$(c%)
2650 sort$(c%,1 TO 2)="00"
2660 END FOR order
2670 END DEFine
2680 REMark **************************
2690 DEFine PROCedure trumps
2700 chan%=18
2710 OPEN #18,scr_50x50a231x103
2720 xpos%=245:ypos%=117
2730 PAPER #18,7
2740 INK #18,1
2750 CLS #18
2760 BORDER #18,3,3
2770 SELect ON t
2780 =1:INK #18,3:hearts:trump$="B"
2790 =2:INK #18,1:clubs:trump$="C"
2800 =3:INK #18,3:diamonds:trump$="D"
2810 =4:INK #18,1:spades:trump$="S"
2820 END SELect
2830 PRINT #18,"TRUMPS"
2840 PAPER #4,7
2850 AT #4,16,40:PRINT #4,"SOUTH"
2860 AT #4,9,40:PRINT #4,"NORTH"
2870 AT #4,12,33:PRINT #4,"WEST"
2880 AT #4,12,48:PRINT #4,"EAST"
2890 PAPER #4,5
2900 END DEFine
2910 REMark **************************
2920 DEFine PROCedure play_point(hand)
2930 FOR card=1 TO 13
2940 card%=card
2950 SELect ON hand
2960 =1:south$(card%)=player$(card%)
2970 =2:west$(card%)=player$(card%)
2980 =3:north$(card%)=player$(card%)
2990 =4:east$(card%)=player$(card%)
3000 END SELect
3010 hand$(hand,card%*3-2 TO card%*3)=player$(card
%)
3020 END FOR card
3030 hand$(hand)=hand$(hand,1 TO 39)
3040 END DEFine
3050 REMark **************************
3060 DEFine PROCedure move_arrow
3070 OPEN #19,scr_510x35a2x169
3080 south_hand$=hand$(lead%)
3090 IF suit$ INSTR hand$(lead%) THEN
3100 FOR sort=3 TO 39 STEP 3
3110 IF hand$(lead%,sort TO sort)<>suit$ THEN sout
h_hand$(sort TO sort)="0"
3120 END FOR sort
3130 END IF
3140 REPeat outer_loop
3150 REPeat skip
3160 IF south_hand$(((pos-10)/38+1)*3)="0" THEN po
s=pos+38:ELSE EXIT skip
3170 IF pos>466 THEN pos=10
3180 END REPeat skip
3190 WINDOW #19,37,35,pos,169
3200 PAPER #19,5
3210 INK #19,3
3220 CLS #19
3230 arrow
3240 REPeat inner_loop:i=CODE(INKEY$(-1)):IF i=200
 OR i=192 OR i=10 THEN EXIT inner_loop
3250 IF i=192 THEN
3260 BEEP 500,200
3270 CLS #19:pos=pos-38:IF pos<10 THEN pos=466
3280 REPeat skip
3290 IF south_hand$(((pos-10)/38+1)*3)="0" THEN po
s=pos-38:ELSE EXIT skip
3300 IF pos<10 THEN pos=466
3310 END REPeat skip
3320 END IF
3330 IF i=200 THEN
3340 BEEP 500,200
3350 CLS #19:pos=pos+38:IF pos>466 THEN pos=10
3360 REPeat skip
3370 IF south_hand$(((pos-10)/38+1)*3)="0" THEN po
s=pos+38:ELSE EXIT skip
3380 IF pos>466 THEN pos=10
3390 END REPeat skip
3400 END IF
3410 IF i=10 THEN EXIT outer_loop
3420 END REPeat outer_loop
3430 led$(follow)=hand$(1,((pos-10)/38+1)*3-2 TO (
(pos-10)/38+1)*3)
3440 BEEP 1000,57-led$(follow,1 TO 2)*4
3450 PAPER #((pos-10)/38+5),5
3460 CLS #((pos-10)/38+5)
3470 south=1
3480 card_print
3490 south=0
3500 CLS #19
3510 END DEFine
3520 REMark **************************
3530 DEFine PROCedure arrow
3540 FILL #19,1
3550 LINE #19,35,0 TO 0,35 TO 70,35 TO 35,0
3560 FILL #19,0
3570 BLOCK #19,12,10,10,18,3
3580 END DEFine
3590 REMark **************************
3600 DEFine PROCedure play_game
3610 READ master_pack$
3620 RESTORE
3630 INK #20,1:CSIZE #20,0,0
3640 pro_tricks=0:contra_tricks=0
3650 FOR hand=1 TO 13
3660 follow=1:suit$="A"
3670 trump_flag=0
3680 decide_lead_card
3690 led$(1)=lead_card$:high_card$=lead_card$&foll
ow&lead%
3700 IF lead%>1 THEN play_card
3710 FOR follow=2 TO 4
3720 lead%=lead%+1:IF lead%>4 THEN lead%=1
3730 decide_card
3740 IF led$(follow,3 TO 3)=trump$ THEN trump_flag
=1
3750 high_card
3760 IF lead%>1 THEN play_card
3770 END FOR follow
3780 score
3790 win=high_card$(5 TO 5)
3800 SELect ON win
3810 =1:top$="SOUTH"
3820 =2:top$="WEST"
3830 =3:top$="NORTH"
3840 =4:top$="EAST"
3850 END SELect
3860 CLS #20:PRINT #20,"      HAND WON BY ";top$\"
    Press 'SPACE' to continue"
3870 PAPER #22,5:PAPER #23,5:PAPER #24,5
3880 PAUSE 500:CLS #22:CLS #23:CLS #24
3890 PAPER #22,7:PAPER #23,7:PAPER #24,7
3900 CLS #20
3910 END FOR hand
3920 result
3930 END DEFine
3940 REMark **************************
3950 DEFine PROCedure decide_lead_card
3960 IF lead%>1 THEN
3970 handval%=hand$(lead%,1 TO 2):suit$=hand$(lead
%,3 TO 3)
3980 FOR choice= 6 TO 39 STEP 3
3990 IF hand$(lead%,choice-2 TO choice-1)> handval
% THEN handval%=hand$(lead%,choice-2 TO choice-1):
suit$=hand$(lead%,choice TO choice)
4000 NEXT choice
4010 lead_card$=handval%&suit$
4020 IF LEN(lead_card$)=2 THEN lead_card$=" "&lead
_card$
4030 spot=lead_card$ INSTR hand$(lead%)
4040 hand$(lead%,spot TO spot+2)="000"
4050 ELSE
4060 south_play
4070 END IF
4080 END DEFine
```

```
4090 REMark ****************************
4100 DEFine PROCedure south_play
4110 CLS #20:PRINT #20,"   Move with 'R' or 'L' ar
row"\"       'ENTER' to select"
4120 move_arrow
4130 lead_card$=hand$(lead%,((pos-10)/38+1)*3-2 TO
 ((pos-10)/38+1)*3)
4140 IF LEN(lead_card$)=2 THEN lead_card$=" "&lead
_card$
4150 IF follow=1 THEN suit$=lead_card$(3 TO 3)
4160 led$(follow)=lead_card$
4170 hand$(lead%,((pos-10)/38+1)*3-2 TO ((pos-10)/
38+1)*3)="000"
4180 END DEFine
4190 REMark ************************
4200 DEFine PROCedure play_card
4210 chan%=20+lead%
4220 chan=chan%
4230 SELect ON chan
4240 =22:xpos%=18:ypos%=113
4250 =23:xpos%=247:ypos%=20
4260 =24:xpos%=473:ypos%=113
4270 END SELect
4280 BEEP 1000,57-led$(follow,1 TO 2)*4
4290 card_print
4300 END DEFine
4310 REMark *******************************
4320 DEFine PROCedure decide_card
4330 IF lead%>1 THEN
4340 flag=0:lose_flag=0
4350 IF follow-high_card$(4 TO 4)=2 THEN lose_flag
=1
4360 IF high_card$(1 TO 2)<10 THEN lose_flag=0
4370 FOR choice=3 TO 39 STEP 3
4380 IF hand$(lead%,choice TO choice)=suit$ THEN f
lag=1:EXIT choice
4390 END FOR choice
4400 IF flag THEN
4410 IF NOT lose_flag THEN
4420 comp2= hand$(lead%,choice-2 TO choice-1)
4430 comp3=high_card$(1 TO 2)
4440 IF comp2>comp3 THEN
4450 led$(follow)=hand$(lead%,choice-2 TO choice):
flag=2
4460 ELSE
4470 FOR suit=39 TO 3 STEP -3
4480 IF suit$ INSTR hand$(lead%,suit TO suit) THEN
 led$(follow)=hand$(lead%,suit-2 TO suit):flag=2:E
XIT suit
4490 END FOR suit
4500 choice=suit
4510 END IF
4520 hand$(lead%,choice-2 TO choice)="000"
4530 ELSE
4540 FOR suit=39 TO 3 STEP -3
4550 IF suit$ INSTR hand$(lead%,suit TO suit) THEN
 led$(follow)=hand$(lead%,suit-2 TO suit):flag=2:E
XIT suit
4560 END FOR suit
4570 choice=suit
4580 IF flag=1 THEN throw_away
4590 END IF
4600 hand$(lead%,choice-2 TO choice)="000"
4610 END IF
4620 IF flag=0 THEN trump_discard
4630 ELSE
4640 south_play
4650 END IF
4660 END DEFine
4670 REMark ****************************
4680 DEFine PROCedure card_print
4690 IF south THEN
4700 card_value%=hand$(1,((pos-10)/38+1)*3-2 TO ((
pos-10)/38+1)*3-1)
4710 led$(follow)=hand$(1,((pos-10)/38+1)*3-2 TO (
(pos-10)/38+1)*3)
4720 chan%=(pos-10)/38+5
4730 xpos%=(chan%-5)*38+18:ypos%=214
4740 ELSE
4750 PAPER #chan%,7
4760 BORDER #chan%,1,1
4770 CLS #chan%
4780 card_value%=led$(follow,1 TO 2)
4790 END IF
4800 card_value$=card_value%
4810 IF card_value%=11 THEN card_value$="J"
4820 IF card_value%=12 THEN card_value$="Q"
4830 IF card_value%=13 THEN card_value$="K"
4840 IF card_value%=14 THEN card_value$="A"
4850 IF led$(follow,3 TO 3)="B" THEN
4860 INK #chan%,3:PRINT #chan%,card_value$
4870 hearts
4880 END IF
4890 IF led$(follow,3 TO 3)="D" THEN
4900 INK #chan%,3:PRINT #chan%,card_value$
4910 diamonds
4920 END IF
4930 IF led$(follow,3 TO 3)="S" THEN
4940 INK #chan%,1:PRINT #chan%,card_value$
4950 spades
4960 END IF
4970 IF led$(follow,3 TO 3)="C" THEN
4980 INK #chan%,1:PRINT #chan%,card_value$
4990 clubs
5000 END IF
5010 END DEFine
5020 REMark *******************************
5030 DEFine PROCedure trump_discard
5040 IF lose_flag=0 THEN
5050 IF suit$=trump$ THEN
5060 throw_away
5070 ELSE
5080 IF trump_flag=0 THEN
5090 lowest_trump
5100 ELSE
5110 overtrump
5120 END IF
5130 END IF
5140 ELSE
5150 throw_away
5160 END IF
5170 END DEFine
5180 REMark ************************
5190 DEFine PROCedure score
5200 suit$=high_card$(3 TO 3)
5210 lead%=high_card$(5 TO 5)
5220 top=lead%
5230 IF lead%=1 OR lead%=3 THEN pro_tricks=pro_tri
cks+1
5240 IF lead%=2 OR lead%=4 THEN contra_tricks=cont
ra_tricks+1
5250 SELect ON top
5260 =1:stricks=stricks+1
5270 =2:wtricks=wtricks+1
5280 =3:ntricks=ntricks+1
5290 =4:etricks=etricks+1
5300 END SELect
5310 CLS #25:PRINT #25,"  TRICKS FOR= ";pro_tricks
5320 CLS #26:PRINT #26,"  TRICKS AGAINST= ";contra
_tricks
5330 END DEFine
5340 REMark ****************************
5350 DEFine PROCedure high_card
5360 IF led$(follow,3 TO 3)=suit$ THEN
5370 IF high_card$(3 TO 3)=suit$ THEN
5380 fig%=led$(follow,1 TO 2)
5390 high%=high_card$(1 TO 2)
5400 IF fig%>high% THEN high_card$=led$(follow)&fo
llow&lead%
5410 END IF
5420 ELSE
5430 IF led$(follow,3 TO 3)=trump$ THEN
5440 IF high_card$(3 TO 3)=trump$ THEN
5450 IF led$(follow,1 TO 2)+13>high_card$(1 TO 2)
THEN
5460 temp_high%=led$(follow,1 TO 2)+13
5470 high_card$=temp_high%&trump$&follow&lead%
5480 END IF
5490 ELSE
5500 temp_high%=led$(follow,1 TO 2)+13
5510 high_card$=temp_high%&trump$&follow&lead%
5520 END IF
5530 END IF
5540 END IF
5550 END DEFine
5560 REMark ****************************
5570 DEFine PROCedure result
5580 CSIZE #20,1,1
5590 IF pro_tricks>contra_tricks THEN
5600 PRINT #20,"        YOU WIN"
5610 games_won=games_won+1
5620 ELSE
5630 PRINT #20,"     OPPONENTS WIN"
5640 games_lost=games_lost+1
5650 END IF
5660 IF games_won=games_lost THEN owinner$="DRAW"
5670 IF games_won>games_lost THEN owinner$="YOUR S
IDE"
5680 IF games_won<games_lost THEN owinner$="OPPONE
NTS"
5690 END DEFine
5700 REMark ****************************
```

```
5710 DEFine PROCedure lowest_trump
5720 found=0
5730 FOR low=39 TO 3 STEP -3
5740 IF hand$(lead%,low TO low)="0" THEN NEXT low
5750 IF hand$(lead%,low TO low)=trump$ THEN found=
1:EXIT low
5760 END FOR low
5770 IF found THEN led$(follow)=hand$(lead%,low-2
TO low):hand$(lead%,low-2 TO low)="000":ELSE throw
_away
5780 END DEFine
5790 REMark ****************************
5800 DEFine PROCedure overtrump
5810 found=0
5820 FOR low=39 TO 3 STEP -3
5830 IF hand$(lead%,low TO low)="0" THEN NEXT low
5840 IF hand$(lead%,low TO low)=trump$ THEN
5850 IF hand$(lead%,low-2 TO low-1)+13>high_card$(
1 TO 2) THEN found=1
5860 END IF
5870 IF found THEN EXIT low
5880 END FOR low
5890 IF found THEN led$(follow)=hand$(lead%,low-2
TO low):hand$(lead%,low-2 TO low)="000":ELSE throw
_away
5900 END DEFine
5910 REMark ****************************
5920 DEFine PROCedure throw_away
5930 posn=0:lowest$="010":p=0
5940 REPeat find
5950 IF posn=39 THEN EXIT find
5960 posn=posn+3
5970 IF hand$(lead%,posn TO posn)= trump$ OR hand$
(lead%,posn TO posn)="0" THEN NEXT find
5980 IF hand$(lead%,posn-2 TO posn-1)>lowest$(1 TO
 2) THEN lowest$=hand$(lead%,posn-2 TO posn):p=pos
n:flag=1:NEXT find
5990 END REPeat find
6000 IF flag THEN
6010 led$(follow)=hand$(lead%,p-2 TO p)
6020 hand$(lead%,p-2 TO p)="000"
6030 ELSE
6040 lowest_trump
6050 END IF
6060 END DEFine
6070 REMark ****************************
6080 DEFine PROCedure display_rules(n)
6090 CLS #20
6100 SELect ON n
6110 =1:PRINT #20,"                                    RUL
ES of QWHIST"\"       Rules are  the same as for n
ormal game of Whist."\"       Opposite players are
 partners.  Play progresses clockwise."\"       Pl
ayer after dealer leads first card."
6120 =2:PRINT #20,"                                    RUL
ES of QWHIST (cont.)"\"       Player who wins tric
k leads next hand.  Trumps are determined by rotat
ion."\"       When play commences, first player an
d trumps are decided at random."
6130 =3:PRINT #20,"                                    R
ULES of QWHIST (cont.)"\"      You play SOUTH.  Se
lect card by using LEFT and RIGHT arrows."\"
Press ENTER to play card selected."
6140 =4:PRINT #20,"                                    R
ULES of QWHIST (cont.)"\"       After each hand is
 played there is a pause to allow you to study han
ds."\"       To speed up play, press SPACE when re
ady to continue with next hand."
6150 END SELect
6160 END DEFine
6170 REMark ******************************
6180 DEFine PROCedure display_scoreboard(n)
6190 CLS #20
6200 SELect ON n
6210 =1:PRINT #20,"                          GAMES PLAY
ED= ";games_played
6220 =2:PRINT #20,"        GAMES WON= ";games_won;
"               GAMES LOST= ";games_lost
6230 =3:PRINT #20," TOTAL TRICKS:        SOUTH= ";s
tricks;"              NORTH= ";ntricks\"
          EAST= ";etricks;"               WEST= ";w
tricks
6240 =4:PRINT #20,"                     OVERALL WINNE
R= ";owinner$
6250 END SELect
6260 END DEFine
6270 DATA " 2S 3S 4S 5S 6S 7S 8S 9S10S11S12S13S14S
 2C 3C 4C 5C 6C 7C 8C 9C10C11C12C13C14C 2B 3B 4B 5
B 6B 7B 8B 9B10B11B12B13B14B 2D 3D 4D 5D 6D 7D 8D
9D10D11D12D13D14D"
```

MAIL MERGE by Stanley Sykes

This handy utility provides a mail merge — listing one — and labeller — listing two — for Quill documents. Set up a Basic DATA file — e.g., listing three — and run the *Mail Merge* program.

You will be asked for the name of the processed document, which should be a Quill list file, with each data item to be merged represented by the CTRL-/ — hold down CTRL and press the backslash key to the right of the full-stop. Second, you will be prompted for the name of the data file, such as that in listing three. The program will them merge the letters.

When you run the labeller program, the inputs required are the number of fields per record; the first field to be printed; the last field to be printed; label size — will vary.

Note that when other files have been used with this program, Quill must have been installed with an end-of-line code LF only, not LF & CR.

```
100 REMark PROGRAM - QUILL MAIL MERGE
110 REMark AUTHOR  - STANLEY SYKES
120 REMark DATE    - 15 MAY 1987
130 REMark VERSION - 1.0
140 :
150 MODE 0
160 PAPER 0
170 CLS
180 PRINT "QUILL - MAIL MERGE"
190 PRINT
200 INPUT "ENTER LETTER <device><file name><extens
ion> ";name$
210 INPUT "ENTER DATA   <device><file name><extens
ion> ";dat$
220 MERGE dat$
230 PRINT
240 file$=""
250 OPEN_IN #9,name$
260 REPeat outer
270  line$=""
280  REPeat inner
290   char$=INKEY$(#9)
300   IF EOF(#9) THEN EXIT outer
310   IF char$=CHR$(10) THEN EXIT inner
320   line$=line$&char$
330   PRINT char$;
340  END REPeat inner
350  PRINT
360  file$=file$&line$&CHR$(10)
370 END REPeat outer
380 PRINT char$
390 file$=file$&line$&char$&CHR$(10)&CHR$(12)
400 CLOSE #9
410 :
420 flag=0
430 RESTORE
440 OPEN#7,ser1
450 REPeat loop
460  PRINT
470  INPUT "Position paper then press <ENTER> any
other to quit ";a$
475  IF a$<>"" THEN EXIT loop
480  FOR count=1 TO LEN(file$)
490   IF file$(count)=CHR$(143) THEN
500    IF flag=0 THEN READ dat$
510    IF EOF THEN flag=1
520    PRINT #7,dat$;
530   ELSE
540    PRINT #7,file$(count);
550   END IF
560  END FOR count
570  IF flag=1 THEN  EXIT loop
580 END REPeat loop
590 CLOSE #7
600 CLS
610 PRINT "END OF MAIL MERGE RUN"
620 STOP
```

```
100 REMark PROGRAM - QUILL LABELLER
110 REMark AUTHOR  - STANLEY SYKES
120 REMark DATE    - 19 MAY 1987
130 REMark VERSION - 1.1
140 :
```

```
150 MODE 0
160 PAPER 0
170 CLS
180 PRINT "QUILL LABELLER - VERSION 1.1"
181 PRINT\"BY STANLEY SYKES - MAY 1987"
190 PRINT
200 INPUT "ENTER DATA <device><file name><extentio
n> ";dat$
210 MERGE dat$
220 PRINT
230 INPUT "NUMBER OF FIELDS PER RECORD ";no_of_fie
lds
240 PRINT
250 INPUT "PRINT FROM FIELD ";from_field
260 INPUT "       TO FIELD ";to_field
270 PRINT
280 INPUT "NUMBER OF LINE PER LABEL + LINES BETWEE
N ";no_lines
290 PRINT
300 DIM record$(no_of_fields,80)
310 RESTORE
320 OPEN#7,ser1
330 PRINT#7,CHR$(27);"E"
335 flag=0
340 REPeat loop
356  INPUT "POSITION LABLE THEN PRESS <ENTER> ";a$
357  PRINT
370  FOR count=1 TO no_of_fields
380   IF flag=0 THEN READ record$(count)
390   IF EOF THEN flag=1
400  NEXT count
410  FOR count=from_field TO to_field
420   PRINT#7,record$(count)
430  NEXT count
440  FOR count=1 TO no_lines - (to_field - from_fi
eld + 1)
450   PRINT#7
460  NEXT count
461  INPUT "POSITION LABEL THEN PRESS <ENTER> or <
A>gain ";a$
462  IF a$=="A" THEN GO TO 410
465  IF flag=1 THEN EXIT loop
470 END REPeat loop
480 CLOSE#7
490 CLS
500 PRINT "END OF LABELLER RUN"
510 STOP


1 CLEAR
2 WINDOW 512,256,0,0:CSIZE 2,1:CLS
3 AT 2,11:PRINT "LOADING QL QUILL"
4 AT 4,13:PRINT "version ";2.3
5 AT 6,6:PRINT "copyright  1984 PSION LTD"
6 AT 8,12:PRINT "word processor"
7 CLOSE #1:CLOSE #2:WINDOW #0,400,20,35,215
8 EXEC_W MDV1_QUILL
9 OPEN #1,scr:OPEN #2,scr
1000 DATA "Mr Bill Smith","22 Moor View","Dalton",
"HUDDERSFIELD","HD4 3RQ","Mr Smith"
1010 DATA "Mr Fred Bloggs","49 Hill Side Cresent",
"Meltham","HUDDERSFIELD","HD7 3JY","Mr Bloggs"
1020 DATA "Mr Robert Sharp","23 Mount View","","RO
THERHAM","","Mr Sharp"
```

MULTI-BOOT
by James O'Conner

Multi-Boot is a program which will boot-up any files on a particular medium, providing they have the endings '_sb' for SuperBasic (LRUN) and '_mc' for machine code (EXEC_W). *Multi-Boot* will display the name of the medium and the number of free sectors. It will then display all the executable files with reference numbers.

All the user needs to di is type one of the numbers which is then validated and, if possible, the program is run.

```
100 REMark                    MULTI - BOOT
110 REMark                 BY JAMES O'CONNOR
120 REMark REMEMBER ! NO NEED TO UPDATE THE BOOT F
ILE
130 REMark ====================
140 REMark Set Windows
150 MODE 4
160 OPEN#3,scr_512x256a0x0:CLS#3:CLOSE#3
170 OPEN#1,CON:OPEN#2,CON
180 WINDOW#0,448,40,32,216
190  FOR C=0,1,2:CLS#C
200 REMark ====================
210 REMark Initialise variables
220 DIM B$(48,40),T$(48,3)
230 COUNT=0:X=6:Y=0
240 REMark ====================
250 REMark Open temporary file on MDV1 to store di
rectory.
260 DELETE MDV1_TEMP_DIR
270 OPEN_NEW#5,MDV1_TEMP_DIR
280 DIR#5,MDV1_
290 CLOSE#5
300 REMark ====================
310 REMark Input all 'Proper' Programs (_SB = Supe
rbasic)
320 REMark                              (_MC = Mach
ine code)
330 OPEN_IN#5,MDV1_TEMP_DIR
340 INPUT#5,NAME$ : INPUT#5,SECTOR$ : REMark Name
of disc and sectors.
350  REPeat LOOP
360   IF EOF(#5) OR COUNT=48:EXIT LOOP
370   INPUT#5,A$
380   L = LEN(A$)
390   IF L<4:NEXT LOOP
400   REMark Check if File is a runable program an
d not a data file.
410   IF A$(L-2 TO L) INSTR "_MC_SB_mc_sb"
420    COUNT=COUNT+1
430    B$(COUNT)=A$(1 TO L-3):T$(COUNT)=A$(L-2 TO
L)
440   END IF
450  END REPeat LOOP
460 CLOSE#5:DELETE MDV1_TEMP_DIR
470 REMark ====================
480 REMark Display name of cartridge and sectors
490 CSIZE 2,1:PRINT TO 12,"MULTI - BOOT":CSIZE 0,0
500 SECTOR$=SECTOR$(1 TO(" " INSTR SECTOR$))
510 INK 4:AT 3,8:PRINT "CARTRIDGE :"!NAME$;:PRINT
TO 43,"FREE SECTORS :"!SECTOR$
520 REMark ====================
530 REMark Print up all proper programs with refer
ence numbers.
540  FOR C=1 TO COUNT
550   IF X=18:Y=Y+19:X=6
560   AT X,Y
570   INK 4:PRINT C!;FILL$(" ",C<10);
580   INK 7:IF LEN(B$(C))>14:PRINT B$(C)(1 TO 13);
".":ELSE :PRINT B$(C)
590   X=X+1
600  END FOR C
610 REMark ====================
620 REMark Get Input from user
630 REPeat GETIT
640  CLS#0:INPUT#0;"TYPE THE CORRESPONDING NUMBER
TO LOAD THE PROGRAM."\I$
650  IF I$="":NEXT GETIT
660   FOR G=1 TO LEN(I$)
670    IF CODE(I$(G)) <48 OR CODE(I$(G)) >57:NEXT
GETIT
680   END FOR G
690  I=I$:IF I$<1 OR I$>COUNT:NEXT GETIT:ELSE :EXI
T GETIT
700 END REPeat GETIT
710 REMark ====================
720 REMark Run program !
730 FILE$="MDV1_"&B$(I)&T$(I)
740 REMark Check if program is machine code.
750 IF T$(I)=="_MC":EXEC_W FILE$:RUN
760 REMark Must be Superbasic...
770 LRUN FILE$
780 REMark ====================
```

MICRODRIVE

THE PROGRAMS

1. Giles Todd — B — DIY Assembler — £5

Feaured in the March to June 1985 issues of *QL User*, this complete two-pass assembler will assemble all 68008 code and support the assembler directives DRG, END, EQU, DC and DS.

2. Richard Cross — A+O — Mini Monitor — £3

Using approximately 3K of RAM, this handy utility will multi-task on your QL, leaving plenty of room for other programs. Commands include dumping registers, memory — and ASCII — machine code trace, register store, memory move, memory store — byte, word and long — and jumps. Featured in *QL User*, Octrober 1985.

3. A Didcock — B — Connect4 — £1

A SuperBasic version of the classic four-in-a-row game where counters drop down slots in the vertical board. First printed in *QL User*, September 1985.

4. Shergold & Tose — B — Golf — £2

With up to 50 courses of varying difficulty, lakes, rivers, bunkers and trees, this is a fine golf simulation. You decide the power and direction of each stroke, striving for a birdie, eagle or even an albatross. Your scorecard may be saved. This program was printed in the May 1985 issue of *QL User*.

5. Williams & Holliday — A+O — Paladin — £5

Written completely in machine code, this excellent *Space Invaders* game was the basis of our games programming series, started in April 1985.

6. Richard Cross — M+B — Sprite Animation — £2

This contains two programs from the April 1985 issue. The first is a SuperBasic multi-coloured sprite designer. The second contains machine code routines to animate the sprites on the screen.

7. Steve Deary — B — Pacman — £1

A well-written maze game from the March 1985 issue. Almost 20 screens of increasing difficulty, including an invisible maze, make it a very versatile rendition of the arcade favourite.

8. Andy Carmichael — B — Family Tree — £3

Based on an article in the August 1985 issue, this is an Archive program and database for setting-up and displaying large family trees.

9. James Lucy — L — Composer — £3

Completed in *QL User*, October 1985 this QLiberated program will allow you to compose, play and amend your own melodies. The program will handle sharps, vary tempo, and even specify staccato and legato playing styles.

10. Matthew Capp — B — Miners — £2

This interesting simulation, printed in the August 1985 issue, puts you in the role of the NCB, buying and selling coal and mines, hiring and firing miners, and raising or decreasing wages to match economic forces. The object is to be profitable but inexperienced players will find it difficult even to remain solvent.

11. P J Smith — B — DIY Adventure — £1

From the February 1985 issue, this skeleton program requires you to slot in the details to create your own adventure programs.

12. R Green — B — Othello — £1

This classic board game, printed in *QL User*, August 1985, can be played by one or two players. The display uses a 3D representation of the board. Average response time by the computer opponent is about 15 seconds.

13. S J Ackers — S — Touch Type — £4

This program consists of a 13-lesson course for typing-in letters, words and phrases, a 700-word vocabulary, an interactive keyboard display and a fingering chart inas more than 30K of code. Scores are displayed based on the time and accuracy of typing. A reduced version of the program was printed in the August 1985 issue.

14. Rob Sherratt — A+O — Fcopy — £4

The first part of this program was printed in the March 1986 issue of *QL World*. The program is an ultra-fast, general-purpose file spooler.

15. Alan Prior — B — World Map — £2

From the March 1986 issue, this program will draw a full-screen, multi-coloured map of the world for geography buffs.

16. J M Dower — B — Mushyman — £2

Printed in the June and July 1986 issues, this provides speedy SuperBasic arcade action as you munch your way round the screen.

17. Tony Quinn — S — CAD QL — £4

CAD design programs are particularly suited to the QL. This version from the September 1986 issue includes features such as rubber-banding and a user-definable symbol library.

18. Stuart Campbell — M+B — Attack of the Things — £3

Typical science fiction horror arcade action as yet more nasties descend on harmless QL owners. Featured in the October 1986 issue of *QL World*.

19. Karl Jeffery — M+B — Starport 2001 — £3

Fast machine code action in this November 1986 version of the *Galaxians* arcade game.

20. Marcus Jeffery — S — QL Go — £4

The oriental game of Go is so complex that even mainframe programs are easily beaten by novice players. To the best of our knowledge, this 15x15 version from the April and May 1986 issues is the only one available for the QL.

21. J P Hartley — B — Britain — £2

Another program for geography buffs from the November 1986 issue of *QL World*. This is a round-Britain geography quiz.

22. KBG Judson — B — Darts — £2

Program of the Month from December 1986. This popular pub pastime requires good hand and eye co-ordination to stop a moving cursor on the on-screen board.

READY TO RUN SOFTWARE

EXCHANGE

23. Neil Taylor S **Window Designer** £2

This useful routine from the February 1987 issue allows you to set up windows on the screen. A procedure for use in your programs allows you to set the position and size of a window using the cursor keys.

---

24. J F Tydeman S **Design 3D** £4

Published in the March and April 1987 issues, this program will allow you to produce 3D screen designs with the minimum of fuss and aggravation.

---

25. D Carmona B **Stellaris** £4

Program of the Month from June 1987. This is an extensive real-time space adventure game against the computer, including economic simulations, lunar landing and superb graphics.

---

26. Robert Noble A+B+O **Video Effects Box1** £3

These machine code SuperBasic extensions allow you to manipulate your screens, save and recall them from memory and clear them in interesting ways. Program of the Month for July 1987.

---

27. H R Pendry B **Pontoon** £3

A graphic version of the classic card game. You play against the computer. Features include changing banker on royal pontoons, accurate betting, five card tricks and so on. Printed in the July 1987 issue of *QL World*.

---

28. Kenneth Cameron B **Picture Puzzle** £2

This short but interesting program from the July 1987 issue sets up an 8 x 8 sliding block puzzle with on-screen graphics. You can select sliding numbers or load your own picture to solve.

---

29. Peter Etheridge B **Bridge** £4

An excellent version of this popular card game. Features include accurate computer bidding, automatic or manual play, replay hands, correct scoring, save and load positions and much more. Essential for card enthusiasts.

---

30. Charles Gerrard B **Psycho** £4

Based on an article in the July 1987 issue, this is an excellent version of the famous *Eliza* program. The cartridge contains a script design program, a pre-prepared script containing more than 50 keywords and an application program. Though written in SuperBasic, complex list processing makes this version extremely fast.

---

31. B Otridge **Crossword** £5

Sold originally as a commercial program, this is the perfect aid for crossword fanatics. The program provides access by word length to a dictionary of about 12,500 words, to help solve those elusive crossword clues. Note: This program requires two Microdrive cartridges.

---

32. Phillip Sproston B **Advent2** £4

SuperBasic arcade adventure with a humorous slant. A variety of rooms, robots and problems will keep you on your toes. Full instructions included.

---

33. Leslie Fahidy B **Clock** £3

This is a complete version of the clock program, described in the June and July 1987 issues of our QL Education series. An on-screen clock can be used to set or read the time.

---

34. E. Bamber **QL Conversion/ Calculator** £2

Comprising weights and measures units conventions and reverse Polish calculation, this excellent utility will convert almost anything to anything. Completely menu-driven, it is very easy to use.

---

35. John Wakefield B **Qwhist** £3

Our August 1987 Program of the Month. It is an excellent implementation of the classic card game, Whist. Designed for one player (south) who partners a computer hand (north) against the computerised east and west opponents.

---

36. Stanley Sykes B **Mail Merge** £1

This cartridge contains very handy utilities providing a mail merge and labeller for Quill files. The cartridge includes a simple demonstration.

---

37. P.G. Ives B **The Double** £4

A large strategy game in which you manage a football team through the four league divisions. The program features buying and selling, team line-up, morale, and so on, through the full league and F.A. Cup season. The cartridge includes full instructions Quill document showing how to play the game.

---

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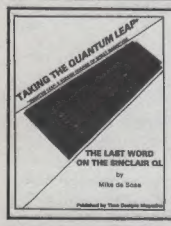

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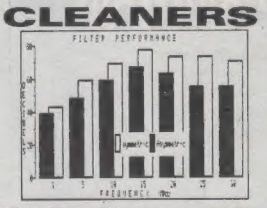

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